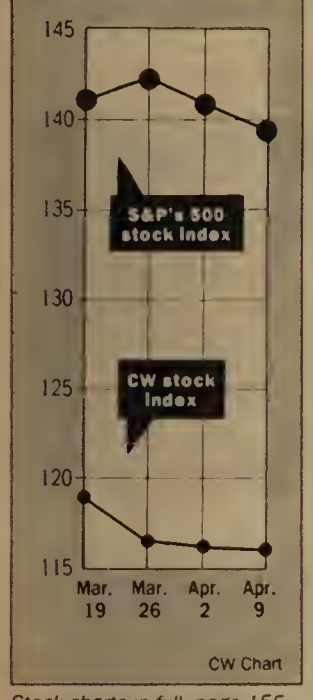
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

COMPUTERWORLD

$2/COPY; $44/YEAR | APRIL 14, 1986 | VOL. XX, NO. 15

Stock update



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NEWSPAPER

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"I've really been bitten by the CEO bug," J. Carl Masi tells *Computerworld* after a reorganization at Wang Laboratories prompts his resignation. **Page 156.**

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Honeywell officials fail to mollify users of its ill-fated Multics system. **Page 4.**

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International Computer Programs, Inc. picks the software winners of 1985. **Page 39.**

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The debate over providing customer access to enhanced service providers is intensified by an unexpected consortium. **Page 19.**

■

At press time, rumors were swirling among the investment community that NCR would offer to acquire all Sperry shares in a merger valued at $4.2 billion. Neither company would confirm the reports. Sperry has frequently been speculated as a merger candidate since it was disclosed that Burroughs last year made an offer [CW, June 17].

■

Apple Computer today is expected to announce the new Macintosh 512K Enhanced system. The replacement for the Macintosh 512K will begin shipping later this month and will feature the internal, double-sided, 800K-byte disk drive used in the Macintosh Plus. The Macintosh 512K Enhanced will sell for the same as the existing 512K Mac's price tag, $1,999.

■

A leading distributor of microcomputer software, First Software Corp. of Lawrence, Mass., is facing a financial crunch. The firm plans to meet this week with its creditors, many of whom are software development companies that have not been paid for their products. First Software recently scrapped a plan that would have allowed its retailers to sell large

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Microsoft to offer volume discount plan

By Alan Alper

NEW YORK — Executives of Microsoft Corp. met last week with major corporate users to launch formally a long-awaited corporate licensing plan. Volume discounts will be offered to corporations purchasing a minimum of $100,000 worth of Microsoft applications software and language products annually.

After the day-long presentation at the Plaza Hotel, however, officials of the second-largest independent micro software supplier had still left questions unanswered regarding discount schedules, onsite training and other key matters.

"From what I know, it sounds interesting, but they didn't say much," commented Sypros Laukatos, a vice-president at Prudential-Bache Securities, Inc. in New York. "It seems as if they want corporations to ask them what the deal is, or perhaps there are different deals for different customers."

Jon Shirley, Microsoft president, said corporations signing a license agreement will receive discounts of up to 35% on volume purchases of software products.

Beyond mentioning a 50% discount for upgrades, Shirley would not provide specifics of the discount schedule.

However, informed Microsoft officials privately listed some generous discounts. They indicated that customers could receive a 45% discount for an annual purchase of $100,000 of Microsoft products. The discount would rise to 50% for $250,000 and to 55% for purchases over $500,000, according to these sources.

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DEC unveils VAX 8500

Seventh intro in 18 months replaces last VAX-11 unit

By Donna Raimondi

MAYNARD, Mass. — Replacing the last of its VAX-11 series minicomputers, Digital Equipment Corp. last week announced a mid-range entry in its second-generation VAX 8000 series. The VAX 8500 replaces the VAX-11/785, offering twice the power in one-third the floor space of the older system.

"We benchmarked the 8500 running All-In-One [DEC's office automation software] with 80 simultaneous users, all interactive, and got two times the perfor-

See **DEC** page 12

IBM sales dip in first quarter

By Clinton Wilder

ARMONK, N.Y. — Evidence of continued computer industry doldrums was apparent in IBM's first-quarter financial report released last week. The company reported a slight dip in equipment sales and only a modest 3.1% gain in profits from its subpar first quarter a year ago.

In reporting only a 3.7% rise in total revenues, IBM said that 9% of those revenues, or $915 million, resulted from a weak dollar. Analysts said approximately

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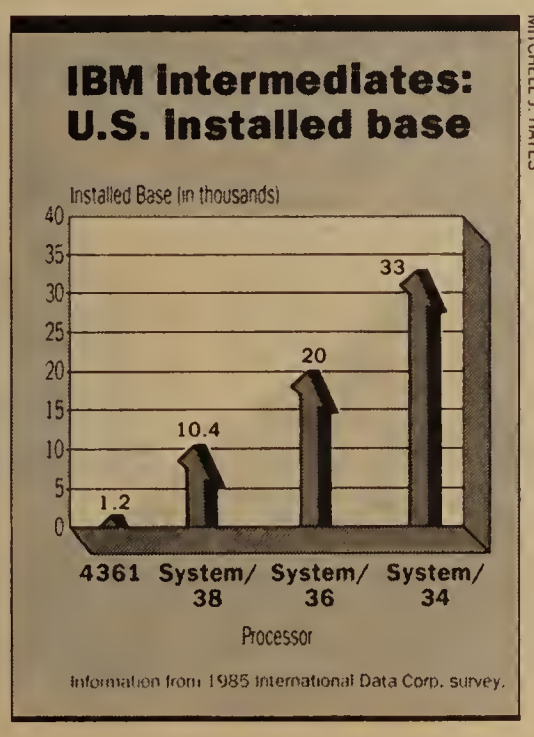
CW EXCLUSIVE

Mid-line crisis: IBM users seek meaning among mini options



By James Connolly

It might be a good way to start a fight. Simply ask a gathering of IBM users, IBM executives and analysts to decide which IBM mid-range computer represents the company's intentions for the rest of the 1980s.

There are as many opinions as there are different types of IBM minicomputers and superminicomputers, and the debate continues over which system can best serve the widest range of customers.

The product line that extends from immediately above the IBM Personal Computer line to just below the IBM mainframe family has been seen by some users and analysts as a maze of processing options. There are more than a score of versions and models, each addressing its own market and, usually, overlapping with at least one model from another product family.

As some pundits note, "IBM must like minicomputers; it has so many of them."

Setting aside such special-purpose systems as the Series/1, IBM is left with five basic models of the System/38, three of the System/36 and three 4361s, with versions of each model also available. Each has advocates in the user community and within IBM who promote its architecture as the technology of the future — and an equal number of detractors who predict its demise.

DP managers who use mid-range systems say they not only look carefully at what IBM offers for functions and performance, but they also try to monitor IBM's development plans. Their fear is that they will be caught with a machine that is made obsolete by a next generation or that they will run out of room to upgrade without running through conversions that can be costly in time and money.

When asked if he would agree with

See **IBM** page 8

Information Builders offers enhanced mainframe Focus

PC/Focus, Unix-based version also released

By Charles Babcock

NEW YORK — Information Builders, Inc. last week announced a transaction-oriented release of Focus that offers a 30% performance improvement over the previous offering, company officials said.

The company also announced a version of Focus to run under Unix, price cuts and enhancements to PC/Focus and a new company division to produce Focus utilities and applications.

Focus is a combination fourth-generation language and data base management system frequently used in corporate information centers. It has been subject to periodic upgrades over its 10-year life span, but Release 5.5 represents a change of emphasis toward efficiency, said Gerald Cohen, Information Builders' president.

The IBM mainframe software showed improved performance in a series of benchmarks, registering gains of 10% to 80%, with an average of 30%, company spokesmen said.

Ross B. Rogers, engineering support manager for Pacific Bell, San Ramon, Calif., said a 30% performance improvement in mainframe Focus 5.5 is significant and will help reduce the work load on the MIS department's IBM 3090 mainframe. Having upgraded from a 3084 to a 3090 recently, the performance improvement of mainframe Focus "will help it last a couple of more years," Rogers said.

The 5.5 release will be more reentrant than the previous release as a result of code that has been redesigned, rewritten and restructured. Reentrant code allows multiple users to share modules of the program stored in one area of mainframe memory rather than each user being allocated individual modules, freeing up mainframe resources, noted Information Builders' Donald Wszolek, vice-president for marketing.

Due out at the beginning of the fourth quarter, Release 5.5 will be priced the same as earlier versions of Focus: $66,000 to $110,000, depending on options. It runs under IBM's VM/CMS and MVS/TSO operating systems. It can be rented for $1,680 to $2,500 a month.

Focus for Unix is designed to run on AT&T Information Systems' 3B minicomputers under Version V.2.1 with the demand paging option.

Focus for Unix is available now in beta release with a production release scheduled for the third quarter. Prices range from $2,895 for the 3B2/300 to $44,000 for the 3B20, spokesmen said.

Release 2 of PC/Focus includes enhancements at a $300 reduced price. Cohen said the firm is attempting to woo users of Ashton-Tate's Dbase III "who have run out of power" and need the capabilities of PC/Focus. The reduced price is $1,295 and can be as low as $795 in volume purchases; the product will be available in July.

The Modify language in PC/Focus has been enhanced to permit faster execution of screens and more efficient memory management. Graphtalk, an ease-of-use front end to previous PC/Focus graphics, has been added along with capability for four to eight colors. Customers may obtain an imbedded spreadsheet, PC/Foccalc, for an additional $495.

Pacific Bell uses PC/Focus on 2,000 personal computers. "A PC/Focus application is generally slow to load, 2 to 5 minutes. It is my understanding the new release will load much, much faster. That first menu comes up almost instantly," Rogers said.

Ronald W. Sella, a PC/Focus consultant and an alpha tester of Release 2 when he served as manager of product development and services of Merrill Lynch, Pierce, Fenner and Smith, Inc.'s Information Products and Services Division, also applauded the fast load modules of Release 2 of PC/Focus.

In his tests, an application developed under PC/Focus could be distributed from one micro to many in 7 seconds. He said the process formerly took a minute. The fast-load module is able to take the equivalent of a snapshot of "a compiled program, incorporating the preassigned work areas and tables, off the hard disk" and distribute it to users.

Information Builders' new Focus Products Division also introduced its first three products:

- Problem Tracking System allows the information center consultant to record details about reported user problems, assign response priorities and maintain a log of service. It will be available in May for $8,500.
- Menu Manager, a utility that simplifies the process of menu creation for Focus applications, will be available in April at a price of $4,500.
- Focus Design Analyzer is a utility that enables application builders to evaluate the efficiencies of alternative data base designs. It will be available in May at a price of $7,000.

NCR to announce fault-tolerant line

By Marc Tournier
Computerworld News Service

PARIS — NCR Corp. sources say the company plans to announce a line of fault-tolerant computers April 22.

The machines, targeted to compete with the IBM System/88, which IBM sells under an OEM agreement with Stratus Computer, Inc., will be called the 9800 series and reportedly will offer a range of computing power from one million to 20 million instructions per second.

NCR officials at the company's Dayton, Ohio, headquarters declined comment on the details provided by European sources although they did confirm that an announcement is scheduled for April 22 in New York.

The new series will reportedly replace all, or at least part, of NCR's V8000 mid-range mainframe family.

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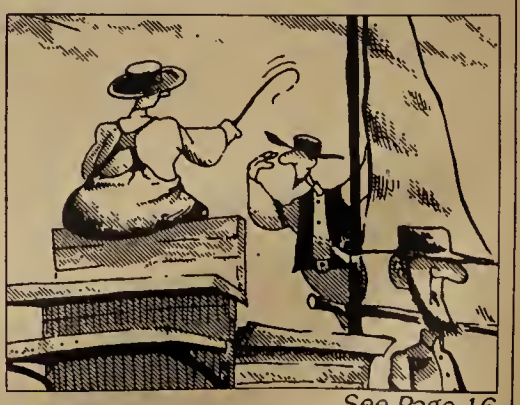

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Honeywell fails to convince Multics users

Skeptical of pledges, group considers other vendors' alternatives

By Rosemary Hamilton

DETROIT — Users of Honeywell, Inc.'s Multics reacted skeptically to the company's pledge last week to ease its withdrawal of support from the operating system. Company officials declined to provide specific details about Multics-like features that they say will be incorporated into a new product line.

The first component of the new line is scheduled for a prerelease showing at the National Computer Conference in June, Honeywell officials said. But users are skeptical of migrating from the 36-bit Honeywell systems they now use to 32-bit systems they know little about.

Some users of Multics, which has developed a small but dedicated base of large-user sites, met with Honeywell representatives during the annual spring meeting of the Honeywell Large Systems User Association (HLSUA), the group's first meeting since Honeywell announced the decision at a January meeting [CW, Jan. 13]. Some of the users said they still felt betrayed by the company's decision earlier this year to terminate future support of Multics.

According to a tape recording of the session given to *Computerworld* by a Multics user, Honeywell officials made repeated attempts to foster a cooperative environment, stressing that they would retain as many Multics-like features as they could.

'Not kindly disposed'

One user said he had difficulty believing what Honeywell said because the vendor has changed its plans before. He cited the Flower project, which would have been a follow-on to Multics, as one example. "We are not kindly disposed toward Honeywell," he said. "It's an issue of betrayal."

The Multics users, including Ford Motor Co., are a small but potent group of Honeywell customers. "It's far more a reputational thing than a financial thing," Eugene Manno, group vice-president of small computers and office systems, noted in a post-conference interview. "There are only a few Multics user sites. That's the good news. But they are extremely visible users. If they walked, it would not do our business any good."

But Manno was confronted by users, wearing black arm bands to mourn the death of their operating system, who did not voice a willingness to go along with Honeywell's strategy of migrating to its new systems. Instead, they challenged the project's deadline and continued to raise the issue of a third-party vendor taking over the operating system.

Manno expressed bewilderment over the users' resistance to Honeywell's strategy. "I guess I'm having trouble understanding what the problem is with looking at this viable migration path because all the other choices I saw were infinitely more complex and more expensive," Manno told the gathering. Manno was one of three Honeywell officials at the Multics session.

The first system in the new 32-bit product line will be shipping by late September, Manno said, and will incorporate some basic Multics-like features such as security. The vendor does not expect to have its most-Multics-like system until sometime in 1988.

The Multics issue has been battered around for almost a year now. In January 1986, Honeywell officially told users that Multics would be phased out after months of hinting in that direction. This came as a crushing blow to its small group of loyal users.

Multics, although 16 years old, is considered a very eloquent operating system. It has built-in features, such as a relational data base, dynamic linking and security, which put it a cut above many other operating systems. But it was also designed to run on outdated, 36-bit hardware. Honeywell said last week it could not justify continued development of hardware that was unlikely to sell beyond Multics users.

Manno's efforts last week to promote a spirit of cooperation were hindered by his inability to provide concrete answers to some of the users' questions. Suspicions were heightened when Manno would not give a specific list of the Multics-like features that will be incorporated into the new system.

Manno also said no tools are available yet to assist users in their migration. He added that he is not going to give users information until it is fact and that work on the Multics-like system is still in progress. Because of this, he said, "I would like very much to get with every Multics user site and at least have our technical people talk to you about where we're going and what our choices are."

'Questioning integrity'

At the session, Greg Clark, a Multics user from Ford, challenged the 1988 date for the release of the most-Multics-like system, saying that the company has a far too ambitious project ahead of it to meet that deadline. Manno said that remark was "questioning my integrity."

Clark also said that Manno's commitment to Multics features was news to him because the vendor had not been giving users any such indication in the past few months. Manno insisted that it had not been a change of heart. The commitment had been there all along, he said; it was just a matter of communicating it.

"The party line was exactly what we expected," said a session attendee who requested anonymity. "They tried to appear more cooperative, but there's been no shift in their intentions."

However, Manno stressed that Honeywell would do whatever possible to make the transition easy and urged users not to switch to another vendor. The users have been reviewing this option for months now. At last week's conference, some of the group held a private session to discuss this option. Control Data Corp. and AT&T made presentations, according to one user, but apparently no clear solution emerged.

TOP OF THE NEWS

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volumes of software to corporate users — a type of site licensing plan. First Software is reportedly second to Softsel Computer Products, Inc. of Inglewood, Calif., in revenue from distribution to retailers.

■

Ashton-Tate is seriously considering removing its highly unpopular copy protection from its software, said Ron Posner, Ashton-Tate executive vice-president, sales and international. "We feel the need for copy protection in the future is less critical, and it will probably, in our opinion, go away. We are evaluating it right now. We don't have any specific time we are going to do it," Posner said.

■

Compaq Computer Corp. made the Fortune 500 list in record time, coming in as the 463rd-largest industrial company less than four years after start-up. Last week the Houston firm also announced it had shipped its 500,000th personal computer. Also making the Fortune 500 ranking for the first time was Dataproducts Corp., at number 479. Meanwhile, Rolm was dropped from the ranking as it was acquired by IBM.

Second-class postage paid at Framingham, Mass., and additional mailing offices.

Computerworld (ISSN-0010-4841) is published weekly, except: January (5 issues), February (5 issues), March (6 issues), April (5 issues), May (5 issues), July (5 issues), August (5 issues), September (6 issues), October (5 issues), November (5 issues), and a single combined issue for the last week in December and the first week in January by CW Communications/Inc., 375 Cochituate Road, Box 9171, Framingham, Mass. 01701-9171.

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Computerworld can be purchased on 35 mm microfilm through University Microfilm Int. Periodical Entry Dept., 300 Zeeb Road, Ann Arbor, Mich. 48106. *Computerworld* is indexed: write to Circulation Dept. for subscription information.

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ABC ABP mcc MEDIA DATA FORM

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Intel's IPSC-VX combines vector, parallel processing

By Maura McEnaney

BEAVERTON, Ore. — Intel Corp.'s Scientific Computer Division today is scheduled to introduce a series of vector-processor-based concurrent computers said to be equivalent to a single-processor Cray Research, Inc. X-MP supercomputer at one-tenth the price.

Designed primarily for scientific computation-intensive applications such as circuit simulation and oil reservoir modeling, the three models in Intel's IPSC-VX combine both vector and parallel processing capabilities running on a Microsoft Corp. Xenix operating system. The systems will be available this summer, Intel said.

By combining vector processing with concurrent capabilities for increased processing speed, Intel is taking a "very realistic" approach to scientific processing, according to analyst Jeff Canin of Hambrecht & Quist in San Francisco. "Obviously they're saying there is enough interest out there for users to attempt to learn scientific processing techniques," he said.

The IPSC-VX series is an enhanced version of Intel's existing IPSC family introduced in February 1985. That product used up to 128 processors with a performance range from 2 million to 8 million floating-point operations per second (MFLOPS). Originally positioned for concurrent processing research, the machines ranged in price from $150,000 to $520,000. The IPSC-VX costs between $250,000 and $850,000. Intel claimed that a maximum configuration, 64-processor IPSC-VX will perform 424 MFLOPS at 64-bit arithmetic precision.

The introduction continues to pit Intel against manufacturers of hypercube architecture systems such as Floating Point Systems, Inc. Floating Point claims its new T Series [CW, April 7] technically could perform up to 262 billion floating-point operations per second (GFLOPS) at prices ranging up to $60 million.

With Intel's addition of vector processing, the arithmetic capability of each node is increased, and data can be processed faster in an assembly line fashion. The concurrency of the machines allow large problems to be split up and distributed in several processing nodes, Intel said.

The three new models — IPSC-VX/D4, VX/D5 and VX/D6 — have 16, 32 and 64 vector computing nodes and 24M, 48M and 96M bytes of distributed memory, respectively.

An Intel ILBX multibus, Intel said, results in a floating-point performance improvement of 100 times on 64-bit vector operations and up to 10 times on 64-bit scalar operations.

Microsoft offers discount plan

From page 1

Microsoft added to user confusion when President Shirley remarked that the company's corporate licensing arrangement had been in effect for a few months. Microsoft executives have repeatedly insisted since November, when the arrangement was first publicly discussed, that details were still being worked out.

Users who have discussed the plan in detail with Microsoft officials have been favorably impressed. "We looked at the discounts of software offered by dealers on Lotus Development Corp. and Ashton-Tate products, and the Microsoft deal looks better than those," said Kevin Maloney, office automation consultant at Combustion Engineering, Inc. of Stamford, Conn.

Software distributor Corporate Software, Inc.'s Chairman Morton Rosenthal said a 35% discount would be comparable with what his firm offers large volume customers for single-copy sales. "We find that the discounts from many [vendor] volume purchase agreements, which require a tremendous amount of up-front commitment and effort to consolidate and finance and distribute, offer relatively little cost advantage."

"This is clearly a policy that is designed to gain market share in applications," said Osman Eralp, a computer software and services analyst with Hambrecht & Quist, a San Francisco Calif.-based investment firm. "Microsoft can afford to be more predatory because of the higher margins in their systems software division and their lower penetration in applications."

Shirley said dealers can participate and receive rebates for their corporate customers who purchase software directly from Microsoft. "We wanted to commission the retailers because in some cases they are involved in the creation of the sale," Shirley explained.

The announcement was made during Microsoft-sponsored seminars for corporate users on the future directions of the software industry held in New York and Chicago last week and covers the firm's entire line of applications software and programming languages; it does not cover operating systems but does include Microsoft Windows.

Under the program, Microsoft will not copy-protect its software, a policy that drew loud applause from the corporate users. Demonstrating a move away from copy protection in single-user sales, Microsoft last week announced a non-copy-protected release of Word, its word processing program (see story page 45).

Microsoft also will allow participating corporations to avoid liability for unauthorized duplication if they implement a program to discourage employees from copying software.

Microsoft provided few details to corporate users at the presentations given during the seminar. Citing the sketchy information provided, many corporate users refrained from commenting on the licensing deal.

A number of corporate users in attendance said they have been approached by Microsoft to participate in the program. None were willing, however, to provide details.

"We're right now conducting negotiations with Microsoft," said Juleano Degrassi of Bell Communications Research Corp. in New Jersey. "Because of the sensitive nature, I can't discuss it."

One attendee, an MIS manager at a Big Eight accounting firm who requested anonymity, said his firm is already participating in the corporate licensing deal.

"It's good for us because we have 300 offices spread throughout the country, and a site licensing agreement would do us no good," he said.

Also of primary interest to corporate users is how Microsoft is going to provide software to large numbers of employees via local-area networks, noted Michael Wells, a software consultant in New York.

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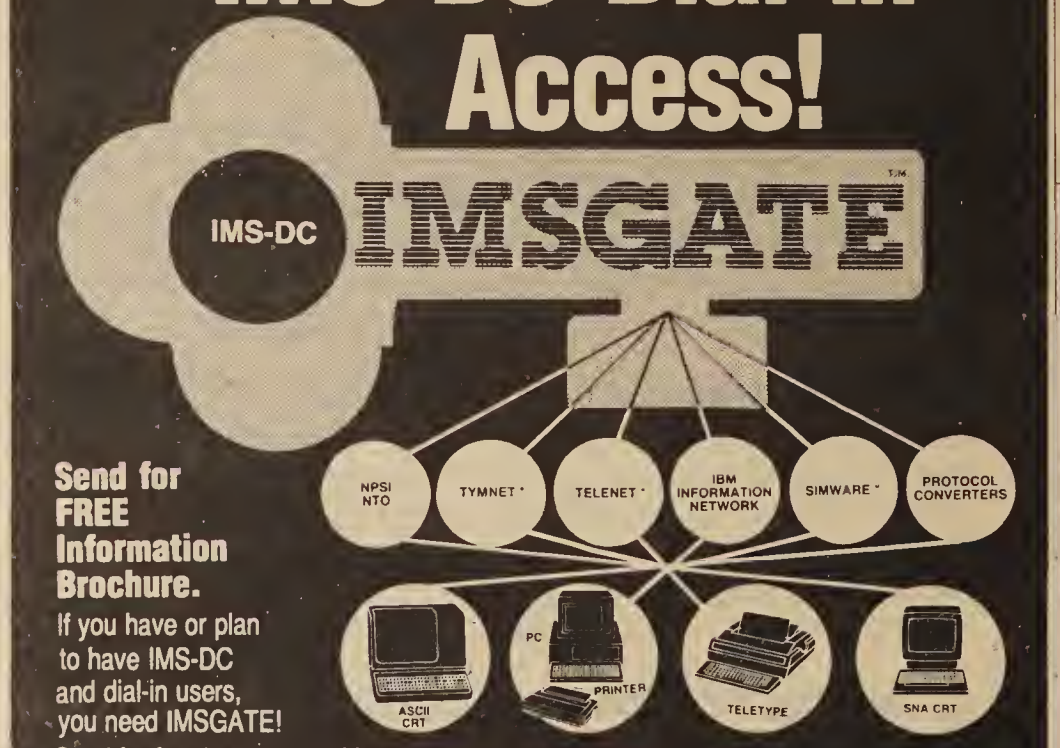

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Sales dip reported for IBM quarter

From page 1

23 cents of IBM's $1.65 per share profits was attributable to the change in currency value, which would place earnings in 1985's "strong" dollars well below year-ago results of $1.61 per share.

"In the U.S., sales of other than high-end products, especially the mid range, probably declined 18% to 20%," said Michael Geran of E. F. Hutton & Co. "Large-scale shipments were probably up but not as much as one would have anticipated, given the newness of the 3090. Some customers obviously elected to install older, cheaper 3081 machines instead."

Although the first-quarter earnings were on the low end of the range Wall Street had estimated, most analysts remained optimistic for Big Blue for the remainder of 1986, particularly for the third and fourth quarters. The effect of the IBM product cycle, recent price cuts and possible high-end performance enhancements are expected to stimulate the current weak demand.

"The first-quarter trend can be reversed when IBM makes true functional improvements to the Sierra later this year," Geran said. "I don't think they'll cut prices again but will work on the functional side, with an intelligent controller, faster channels and better storage."

"As the year goes on, we'll find out if there is price elasticity of demand," said Bob Djurdjevic of Annex Research, a Phoenix-based computer industry research firm. "But I look for relief later this year. The first quarter came in at the low end of expectations, but I don't see any changes of significant proportions. We're talking about nuances."

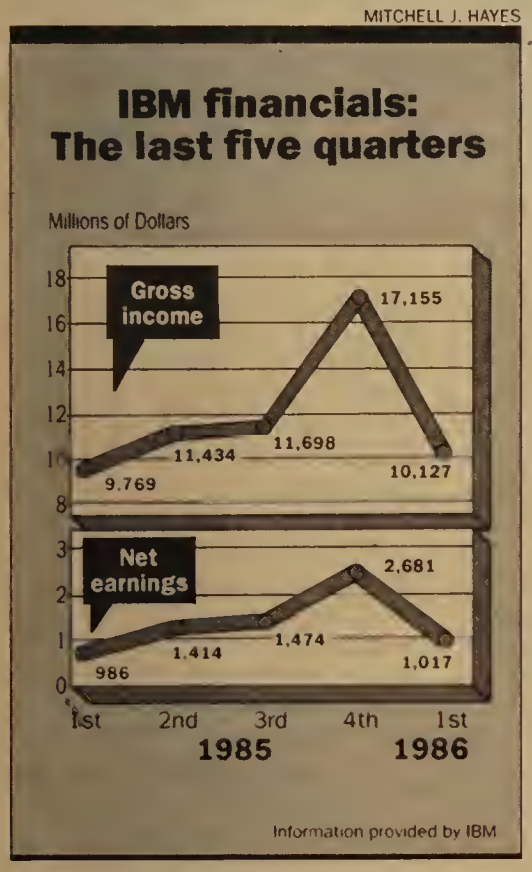
"I would have thought the fourth-quarter momentum would continue, but the strong medicine of price cuts in February should be enough to get buyers off the fence," said Robert Fertig, president of Enterprise Information Systems, Inc., a Stamford, Conn., research firm. "In the next few months, we'll see decisions for major procurements again."

Overall, IBM's first-quarter revenue from product sales declined 0.3% to $6.1 billion, and rental income plummeted 32.7% to $812 million, offset by a 31.5% jump in service revenue to $3.21 billion. "The fact that actual shipments were down is bothersome to me," said Thomas Rooney of Donaldson, Lufkin & Jenrette. "That's not an impressive trend."

Analysts said the weakness in product shipments resulted from a slow phase in the IBM product cycle, combined with the sluggish U.S. capital spending trend cited by IBM President and Chief Executive Officer John F. Akers. "Capital spending continues to be impacted by uncertainty about the effective dates and provisions of potential tax reform legislation," Akers said, referring to the proposed elimination of the investment tax credit for major capital purchases.

IBM also continued its trend of holding down expenses, which rose just 4.5% over year-earlier levels, an increase that Geran called "Scrooge-like." Overall, IBM posted sales of $10.12 billion, compared with $9.77 billion a year ago and $17.15 billion in the fourth quarter of 1985. Profits were $1.02 billion, up from $986 million in the first quarter of 1985 and down from $2.68 billion in the previous quarter.

MITCHELL J. HAYES



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		60	83335	80	1600	79	1524	1	76
		90	83305	72	1478	74	1478		
		120	83275	72	1478	74	1478		
		150	83245	72	1478	74	1478		
		180	83215	72	1478	74	1478		

VOLSER	DEVTYPE	ADAYS	AOATE	TOTAL OSNS	TOTAL TRACKS	-- PS/PO --- OSNS	TRACKS	-- OTHERS -- OSNS	TRACKS
TOTAL	3380	30	83365	1523	19800	1467	17924	56	1876
		60	83335	1493	18776	1446	17100	47	1676
		90	83305	1492	18700	1446	17100	46	1600
		120	83275	1492	18700	1446	17100	46	1600
		150	83245	1486	18100	1446	17100	30	1000
		180	83215	1486	18100	1446	17100	30	1000

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MVSYS1	3380	13275	7359	124	56%	3947	91	30%	3412	33	46%
MVSYS2	3380	13275	11223	97	85%	1634	18	12%	9589	79	86%
TSO001	3350	16650	16125	968	96%	4015	29	24%	12110	939	75%
TSO002	3350	16650	15500	812	93%	3900	150	23%	11600	662	74%

VOLSER	DEVTYPE	TOTAL TRACKS	--- ALLOCATED --- TRACKS	OSNS	PER	-- INCREMENTAL -- TRACKS	OSNS	PER	---- SAVINGS ---- TRACKS	OSNS	PER
TOTAL	3350	33300	31625	1780	95%	7915	179	24%	23710	1601	75%
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IBM users seek meaning

From page 1

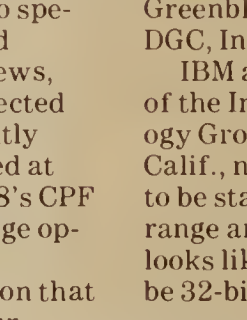
those who describe the middle range as confusing, the president of IBM's System Products Division says that it should not be. But, notes IBM's Stephen Schwartz, "Any time there are a lot of alternatives, if the marketing organization does not help the customer understand the differences, it can be confusing."

A System/38 hot line coordinator for the IBM users group Common is one who says that the middle range is clearing. "I do not find it as confusing as I used to. I think the key to a decision has to be what you own in terms of software," says Gene Gellman, director of information systems for Cyro Industries, a Sanford, Maine, plastics manufacturer.

Gellman notes that it is basically size that separates the System/36 from the 4361 and System/38. He adds that if someone has usable IBM 370-based software, the 4361 may be a better bet but that the System/38 is better if a company wants to rebuild its software inventory.

Indicative of some of the confusion surrounding the three product lines is how users respond when asked how they would like IBM to enhance their systems. They cite the features offered by the other two, with System/38 users asking for the power and disk storage of the 370 line. System/36 users cite the need for data base capabilities and development tools — System/38 strongpoints — and 4361 users look for the simplicity of a non-370 life.

"We do our own code, so we would like to have some more development tools, some productivity tools, and we would like to have a data base capability," says Dennis M. Klinger, vice-president for MIS at Ryder Truck Rental, Inc. of Miami, a firm that runs about 15 System/36s.



Schwartz

IBM pushes the System/36 as an office system or departmental processor for untrained users and the System/38 as a general commercial data processing machine that, with its data base capabilities, can serve as a host for a medium-size business or remote site. However, IBM officials have said they want to strengthen the office and communications abilities of the System/38, which could drive it into the System/36 market, particularly where both systems are used as hosts for small to medium-size businesses.

But the foggy future of the IBM mid range may be clearing with a picture emerging that shows all three systems — as they are known today — dead and replaced by one- or two-microprocessor-based, multioperating system machines within a couple of years.

One consultant who specializes in the IBM mid range, David H. Andrews, claims that IBM redirected its development recently with new efforts aimed at making the System/38's CPF the dominant mid-range operating system.

"There is no question that in the last three or four months, IBM has reaffirmed that the System/38 is a strategic product. I would have assumed that we would see continued boosts for the System/36 for the next few years until recently. Now it appears that the next thrust for large System/36 users will be into the System/38," says Andrews, president of Andrews, Duerr & Manteghian, Inc., of Cheshire, Conn. He says a sign for the future is what he sees is an IBM plan to bring the System/36's SSP under CPF as a VM-type guest operating system.

In line with Andrews' view, Gellman adds that he has heard the rumor that IBM Chairman John Akers redesignated the System/38 as a strategic system, a subject upon which Schwartz declined comment. But Gellman also says he would not be surprised to see IBM offer larger System/36s that would overlap with the low end of the System/38 line.

A Dallas consultant agreed that at least part of the System/38 will be at the heart of IBM's future mid-range system. "I see the 38 as the target. The next system may not be 38 hardware, but IBM can target 38 software rather than SSP or DOS/VSE," comments David Greenblatt, president of DGC, Inc.

IBM analyst Brian Jeffery of the International Technology Group in Palo Alto, Calif., notes, "IBM appears to be standardizing its mid-range architecture, and it looks like the standard will be 32-bit hardware." Jeffery

See **IBM** page 10

IBM targets key lines

Exec sees need for variety of systems

By James Connolly

WHITE PLAINS, N.Y. — Development dollars will pour into IBM's System/36, System/38 and 4300 lines, as those computers remain keystones of IBM's intermediate systems, according to the president of the System Products Division.

Stephen Schwartz, responding to questions about the markets that the systems serve, says IBM will spend the lion's share of its development dollars in the mid range on those products and that IBM needs a variety of systems rather than a single-architecture product line.

"I do not think we have seen the architecture that can be all things to all people," Schwartz says.

"There really is quite a difference in the three systems. There certainly is price/performance overlap, but not necessarily function overlap."

Schwartz cites the following strengths:

• The System/36 was designed for users with minimal data processing experience who want to draw on a large software library built up by IBM and third-party developers.

It can be a host in a small company or can be a distributed or departmental processor in a large firm.

• The System/38 can act as a host in a medium-size company or a distributed system, particularly in a company that does not have an IBM 370 commitment.

The System/38 features strong development tools and a built-in relational data base system.

"The 38 is a very advanced architecture, and we want to take what we have learned and make sure we make that available to a wider range of customers."

• The 4361 can serve the general DP and engineering/scientific markets and is attractive to customers who have the 370 commitment.

Schwartz adds, "We have multiple solutions because our customers' requirements are so broad.

"In a perfect world, would you try to narrow that to one or two? Sure. But the world does not unfold in a perfect way, and it is hard to get everyone's requirements to fit into a handful or just one or two solutions."

He says some customers want a common architecture. To them, application portability is more important, which is why IBM is making such a commitment in areas such as Systems Network Architecture.

"If all of the hardware and software manufacturers do their job, the customer will never know what the architecture is under the covers. It will be transparent," Schwarz says.

IBM defines sides in departmental system vs. PC net debate

Type of application, number of users often dictates proper choice

By Eric Bender

WHITE PLAINS, N.Y. — Despite the never-ending controversy about the relative virtues of departmental processors vs. microcomputer local-area networks, IBM customers typically face some straightforward choices, suggests Richard Sullivan, IBM's director of national marketing support for telecommunications marketing.

These boil down to the types of applications, the number of users who access the same files, the size of those shared files, system management features and other services, according to Sullivan, who was interviewed recently.

When users are continually connected to a large data base, work all day on the same application, need near-instantaneous response but do not require much user-to-user communication, "we see that as the environment for the traditional fixed-function display or personal computer directly attached to the host," Sullivan says.

A prime candidate is a financial department, where dozens of users typically access the same application on a local data base.

On the other hand, personal computer local-area networks are suitable for peer-to-peer communications between business professionals and support staff "where you want to share some data in terms of your personal files or you need to send messages back and forth to individuals within the same department," Sullivan says.

System loads also are critical, Sullivan claims. "If you've got 10 or more users who all have to access the same file, it's more effective to put that file on a departmental processor," he says.

He notes that file sizes currently are restricted on IBM's micro networks because the Personal Computer AT server offers a maximum of 30M bytes of mass storage.

While third-party vendors sell more powerful systems that may offer much larger amounts of storage, Sullivan maintains, "If you look at it, you really start to build departmental processors on the local-area network. We think it's easier just putting a departmental system on a local-area network."

'Network will be transport mechanism'

In the future when IBM delivers such capabilities, "the network will become the transport mechanism, the way I attach my PCs to my department system, as opposed to the vehicle for sharing information," he says.

Another key concern for many users is system management, Sullivan emphasizes. "I can see a departmental system providing more network management control than you will get with a local-area network. Local-area networks need to be enhanced to be able to manage and control loads centrally."

He agrees that PC nets are often viewed as much cheaper than departmental processors, for a given number of users, but says that this may be misleading if all components, including multiple copies of software, are totaled.

"The local-area network is an entry solution, if you will, for the departmental processor," Sullivan suggests. "Many customers are putting in local-area networks and growing to a departmental processor."

The two IBM networks now supporting micros fill very different needs, according to Sullivan.

IBM sees the Token-Ring network, which was shipped last month, as a way to simplify life for customers, he says. "We don't want to add any more to the options that the customer has to look at. Don't necessarily look at the Token-Ring as being a different option; it's a transport mechanism."

Despite delivery of the Token-Ring net, the broadband PC Network that began shipments a year ago "is still being installed at an excellent rate," Sullivan says.

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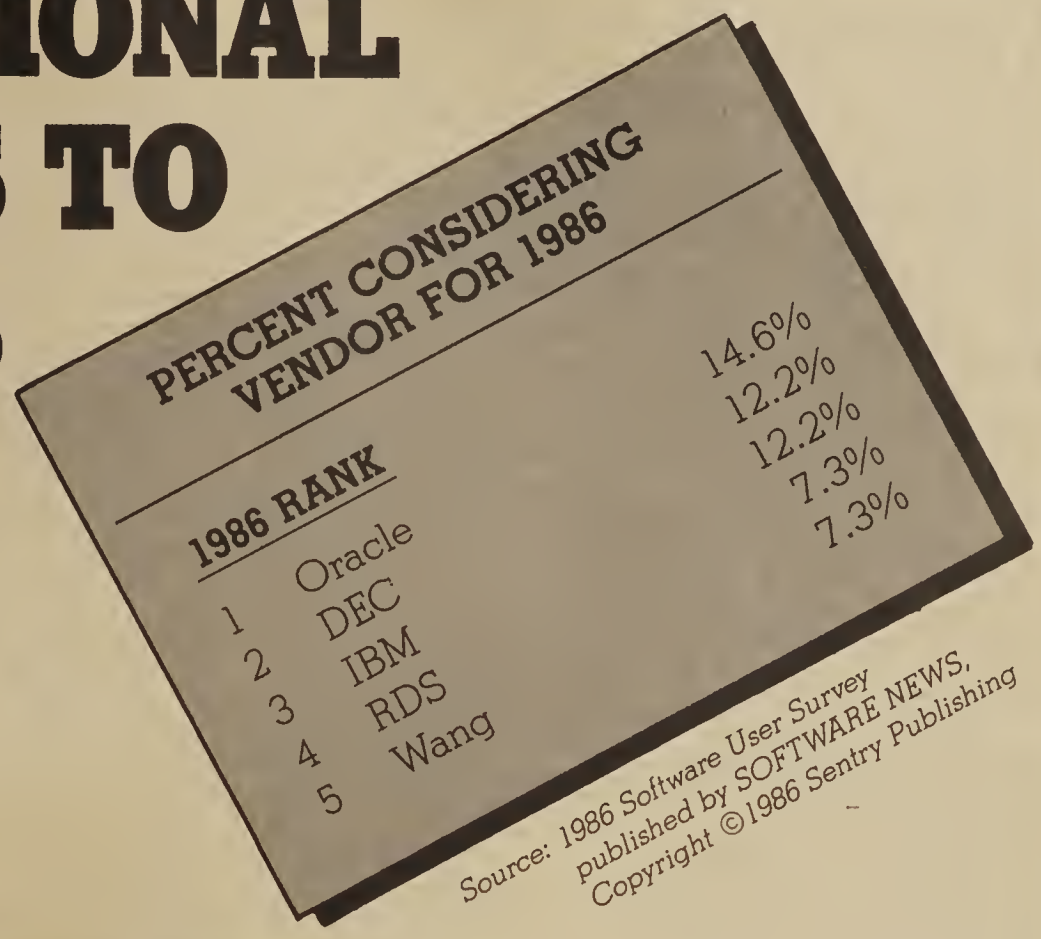

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Chicago ..... March 13, April 16
Cincinatti ..... March 4
Cleveland ..... April 2
Columbia, SC ..... March 11
Columbus ..... March 5
Convent Station, NJ ..... April 7
Dallas ..... April 1, May 6
Dayton ..... April 3
Denver ... March 13, April 8, May 15
Des Moines ..... March 19
Detroit .... March 13, April 8, May 7
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Ft. Worth ..... March 11
Houston March 20, April 17, May 15
Huntsville ..... May 8
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Iselin, NJ ..... March 20, May 15
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Lubbock ..... April 8
Milwaukee ..... May 21
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IBM users seek meaning

From page 8

adds that he "leans toward" saying the Intel Corp. 80386 will be at the heart of a new architecture. He differs from those who say CPF will be the dominant operating system by predicting that IBM will drive System/38 users into the mainframe by letting CPF run under VM.

But Schwartz maintains that the key to the mid range is not the architecture — what is "under the covers" — but what the user sees on the display screen.

Project killed

Andrews, who bases his predictions on talks with current and former IBM personnel, claims that IBM has killed the research project known as Fort Knox.

He says that project was aimed, in part, at developing a single system to run CPF and the mainframe-oriented MVS. He claims IBM was unable to build a single machine that served equally well both the System/38 and 4361 users, many of whom still run IBM DOS/VSE.

Now, Andrews says, IBM plans to announce a new version of CPF this summer, possibly at the same time that it introduces a long-expected, high-end System/38 and a low-end System/38. He says another upcoming announcement for System/38 users is a high-capacity replacement for IBM's 3370 disk drive.

Overlapping marts

Complicating the dispute between the System/36 and System/38 factions are the facts that their markets overlap more than IBM may admit and that migration from one system to the other can require major conversion efforts.

Jeffery notes that most Fortune 500 companies that use the System/36 use it for data processing at remote sites, not for office automation. For the small and medium-size businesses that outgrow their System/36s, the System/38 remains the logical migration path, Andrews adds.

Gellman, who manages two System/38s in his DP shop, concurs, noting that bringing SSP under CPF as a guest operating system makes sense, encouraging users to migrate from the System/36 to the System/38 and to use the System/38 as a host for several System/36s.

Some industry observers, including consultant Dale Kutnick of Wayland, Mass., have predicted that an IBM 370-architecture, microprocessor-based replacement for the 4361 is destined to be IBM's departmental system of the future. Other industry sources claim that IBM has under wraps more powerful models of the recently introduced RT Personal Computer that could also claim a role as departmental systems.

If the predictions of a micro-based 370 machine — predictions fueled by IBM's March preview of its experimental Micro 370 chip — come true, it could mean that System/36 and System/38 users would have to abandon their own architectures, particularly if the system outperforms the System/36, which has been criticized by users as being short of power.

Jeffery, speculating that the Micro 370 may not be the strategic product it once was thought, theorized that whatever the next-generation hardware is, it should allow a "mix-and-match" approach to support the varied applications and operating environments now served by the mid-range machines.

Users still buying

But while the speculation about all three systems continues, companies continue to buy each.

Gellman says his company saved $1.5 million in hardware costs and software expenses by choosing the System/38 over a 4300.

One large company that is committing to the System/36 is Ryder. "We are running 15 or so System/36s in remote profit centers now and are intending to run more than 200 of them," Ryder's Klinger reports.

Upload to mainframes

Klinger emphasizes that Ryder is using the System/36s for general "small-business-type" applications and that the systems upload to mainframes via telephone lines each night.

In Houston, Allright Auto Parks, Inc. recently replaced an IBM System/3 Model 15D with a System/36 Model 5360 to serve as a host for IBM Personal Computer XTs in 80 cities where the company manages parking lots. DP manager Don Whalen says the System/36 runs accounting and payroll applications in a batch mode and that interactive applications will be added soon. To Whalen, the System/36's strength is that it needs less support staff than does a 4300. However, he also wants better data base capabilities and outboard disk support.

A Boston-area System/36 user — a small business analyst and consultant who asks not to be identified — says that his DP clients seldom outgrow their System/36s but that office automation programs such as Displaywrite/36 fail to provide the performance that would make a System/36 suitable for the office and that the system still lacks a link to the IBM Token-Ring network.

He also notes that whatever the system of the future, the user does not care what the hardware looks like. He says that what his clients want is the ability to use "artificial intelligence-type" systems to support English-language queries. He also expects any replacement machines to support multiple operating systems, including IBM PC-DOS, but, again, emphasizes the need for user transparency.

It is in that area of transparency that Gellman — the user from Maine who notes that he would like to see SQL support on his System/38 — Texas manager Whalen — who wants greater data base capability for his System/36 — and Schwartz — the IBM executive who says the users do not care what is under the covers — seem to agree.

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DEC unveils VAX 8500

From page 1

mance of the 785," said Donald McInnis, DEC engineering program manager. Similar performance gains resulted from scientific/engineering benchmark tests, he said.

The 8500 was designed for both commercial and scientific computing, said Harvey Weiss, vice-president of sales operations. It is targeted for areas such as interactive time-sharing, distributed departmental computing, as a departmental host or in a Vaxcluster arrangement, he added.

One user of DEC's VAX-11/785 said he was "a little overwhelmed" by DEC's rapid-fire announcements. "We are still rewriting stuff for peak performance that we dumped from our PDP-11s to an 11/785 18 months ago," said Richard S. Laymon, director of management information systems for Collier County in Naples, Fla.

The 8500 was the seventh major system to be announced in the past 18 months, and DEC spokesmen say more units — at both the low and high ends — will be announced in future months.

"Its very clear that DEC's strategy of forcing more and more new products through the time tunnel is accelerated," said Michael J. Geran, financial analyst at E. F. Hutton & Co. in New York.

DEC is now a $7 billion company, he said, and the company must invade a wider spectrum of applications if it is to grow. "Inevitably, they are hitting competition with the largest vendor — IBM," he added.

DEC's announcement process was unique for this product in at least two regards.

"We are an OEM for DEC, and they do generally give us advance notice. But not this time, " said Erik Husby, VAX system development manager at Project Software and Development, Inc. of Cambridge, Mass.

Also, DEC declined to provide names of beta-test site users, a customary practice at DEC product announcements. The company offered no explanation for these departures.

Weiss compared the system's performance with that of IBM's 4381 Model 13, which has an estimated 3.5 million instructions per second (MIPS) rating.

The approximately 3 MIPS 8500, available in May, falls in place between the low-end trio of Microvax II, VAX 8200 and VAX 8300 and the high-end trio of VAX 8600, VAX 8650 and VAX 8800.

It is software compatible with all other VAX machines and will soon have a version of Ultrix, DEC's University of California at Berkeley 4.2-type Unix, as well as its native VMS operating system.

Smaller footprint

The 8500, with 20M bytes of main memory, is physically small compared with the 8200 and higher machines, with a 27-in. by 30-in. footprint. The small size is possible partly because it is the first model in the second generation to come with only the DEC VAXBI bus and not the DEC Unibus interface.

It has 64K bytes of cache memory between the CPU and the main memory and floating-point operations for 32-, 64- and 128-bit calculations. It comes with a VAXBI bus channel as an I/O bus, and another can be added.

Adding a DEC Unibus connection so that users can hook up older DEC peripherals or adding the 8500 to a cluster requires the additional VAXBI channel, which costs about $15,000.

In addition to announcing the 8500, DEC also released two VAXBI options that allow the 8500 to operate exclusively using the VAXBI bus. Previous models had VAXBI and Unibus channels.

The DMB32 VAXBI communications controller costs $4,350 and allows a combination of modems and terminals to communicate with the 8500. It also provides a connection for high-speed line printers.

The TU81-Plus magnetic tape subsystem costs $27,500. It comes with a native VAXBI adapter and includes a 256K-byte cache buffer within the tape drive to improve streaming tape performance.

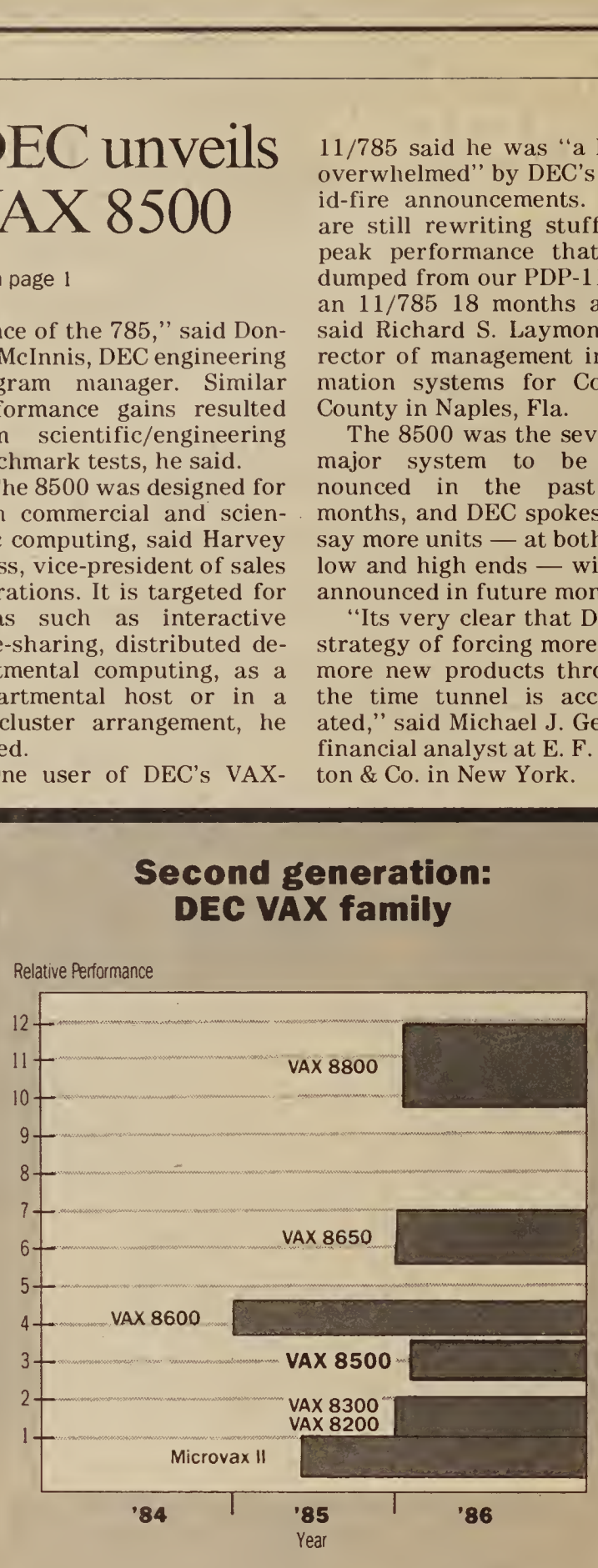
During periods of heavy I/O system load, the additional bandwidth provided by direct connection to the VAXBI bus offers more performance potential over that provided by Unibus-based tape subsystems, the vendor said.

The 8500 comes in three configurations. A basic system costs $260,000 and includes a KDB50 disk controller, Ethernet port, console, one VAXBI I/O channel, VMS and Decnet licenses. A building block system with Vaxcluster port costs $286,000, and a "preconfigured" system costs $299,000 and includes an RA81 disk drive, a TU81-Plus tape drive and the DMB32 communications controller.

In the 8500 announcement, DEC also said that memory for the VAX 8650 has been increased from 4M bytes to 16M bytes in its basic system package. The price has been cut by about $75,000 to $400,000. The company said that its Ultrix operating system is now available for the VAX 8200.

The VAX-11/780 and 785 will continue to be manufactured for as long as there is a demand for them, a DEC spokesman said.

Second generation: DEC VAX family



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NEWS

Federal agencies driving market for optical disk storage

Vendors at FOSE take steps to lift burden of storing documents

By Mitch Betts

WASHINGTON, D.C. — Federal agencies are exhibiting a big appetite for optical disk storage and retrieval systems to handle their large-scale paperwork problems, and vendors at the Federal Office Systems Expo (FOSE) last week took steps to meet that demand.

With an eye toward the government and corporate markets, 3M Co. of St. Paul, Minn., made its first big step into optical disk technology with the introduction of the Docutron 2000 document storage and retrieval system. The $100,000 system consists of a document scanner, an optical disk drive for 12-in. write-once platters storing 3.6G bytes, a file management system, a 17-in. VDT and a laser printer.

"Our study of the situation shows the government has a very significant appetite for this technology," Richard Woodward, 3M's electronic document systems manager, told *Computerworld*. "As a market segment, it's big," he said.

A strong competitor in the market, Filenet Corp. of Costa Mesa, Calif., announced an enhanced version of its Osar optical disk-based storage and retrieval unit that holds up to 204 disks.

The vendor said the new Osar 200 jukebox, priced at $160,000, is suited to high-volume government applications because it provides nearly three times more storage capacity than the prior generation.

Filenet also announced that it recently signed contracts worth almost $7 million with federal and state agencies, including one with the U.S. Air Force.

As a user organization, the federal government is in the unusual position of actually driving the market for optical disk systems because of the government's obvious need for storing and retrieving large volumes of paper and other images, according to William L. Hooton, director of the National Archives' optical digital image project.

At a FOSE session on optical systems, Hooton and Connie W. Moore, a senior MIS consultant with Arthur Andersen & Co., noted that the government users group — the Digital Image Applications Group — has grown to more than 400 members.

The National Archives, the Internal Revenue Service, the U.S. Patent & Trademark Office and the Library of Congress all have serious studies or projects under way to use optical disk technology [CW, Dec. 3, 1984; May 20, 1985].

> ***The National Archives has about six billion pages of images, 16 million photographs and five million maps and charts and is simply running out of room for them all.***

Hooton added that the National Archives plans a pilot project to evaluate whether optical disk systems can be used to scan, store and retrieve the institution's massive holdings of historical documents. He said the National Archives has about six billion pages of images, 16 million photographs and five million maps and charts and is simply running out of room for them all.

"We have had a microfilm program for the past 30 to 40 years, but it hasn't made a dent," Hooton said. Moreover, the old documents are crumbling, so archivists hope that optical scanning and storage will preserve and even enhance the images.

A contract for the pilot project, covering 1½ million pages of Civil War records from the state of Tennessee, will be awarded to a systems integrator in a month or so, Hooton said. By early 1989, the National Archives and records administration will decide whether to take the plunge into optical disk technology.

The IRS also is on the verge of operation of its pilot program, using optical disks to store tax records at the Fresno, Calif., processing center, according to Frank Moore, manager of the IRS project. "We are running out of places to put paper, and we are losing control of the situation," Frank Moore said, alluding to the fact that the government is now storing nearly two billion tax filings.

Although enthusiastic about optical storage technology, most agencies are taking the cautious approach of conducting pilot projects and studies to evaluate all of the technical, legal, budgetary and managerial issues surrounding such a major change in government operations, Hooton said.

One pressing concern, according to Hooton and Connie Moore, is the Gramm-Rudman-Hollings budget reduction law, which may result in automatic budget cuts. "I hope that Congress is not shortsighted enough to stop our expenditures," Hooton said, because there are tangible and intangible benefits to the optical storage systems.

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IBM seeks software firms' kinship

Adapso members welcome offer

By Charles Babcock

HOUSTON — IBM is looking for more "long-term, working relationships" with independent software companies, an IBM official told members of the Association of Data Processing Service Organizations, Inc. (Adapso) last week.

The relationships could range from IBM marketing an independent's product under the IBM logo to an independent doing contract work for IBM, according to Robert Berland, director of strategic planning for IBM's Information Systems Division.

"Software is a critical problem. It's hard to write and hard to maintain. . . . We can't do it all ourselves," Berland said.

The message was a welcome one to members of Adapso, an association of software and service vendors, although some said the offer was good only as long as IBM felt like extending it. Many independent software vendors presume that IBM wants to nurture its software revenues and that the industry giant could prove a formidable competitor in areas where it decides to compete.

But Richard Thatcher, vice-president of AGS Computers, Inc. in Mountainside, N.J., said, "There has never been an opportunity like today to partner with IBM."

No magic with IBM

Berland claimed there was no magic to working alongside IBM or marketing a product under the IBM name. An independent's product would have to join a list of 1,500 IBM software products that its own sales force has difficulty keeping straight, he said.

At the same time, outside companies offer the prospect of providing more applications programs, or what Berland termed "business solutions," to IBM customers.

Customers spend "a pathetic amount of time" trying to find such solutions, which are hard to develop without industry-specific expertise.

"You can't take a kid just out of college, stuff him into a white shirt and blue suit and make an industry expert out of him," Berland said.

"IBM has never been more open to try to change things, to try to develop working relationships," relationships that last a decade or more, Berland said.

Companies with existing, successful products are the easiest with which to form relationships, Berland noted. Developers with an idea may also contact IBM's manager of external submissions, but they should be careful not to divulge proprietary information, he said.

Even with an existing product, forging the relationship can be a long and arduous project, according to Berland. Bringing an independent's product to market under an IBM logo is a process that takes a minimum of two years, he said.

IBM is looking for relationships with outside service providers as well, particularly in systems integration and development.

One advantage to forging a working relationship with IBM is its newly implemented information network. The network provides a source of direct product information to customers and is beginning to tie IBM suppliers, support personnel and customers together, he said.

Tandem to announce top-of-the-line Nonstop

By Jeffry Beeler

CUPERTINO, Calif. — Tandem Computers, Inc. today will extend its Nonstop processor family with a high-end machine that reportedly provides 50% greater performance than the company's existing top-of-the-line system for a 20% to 30% higher price.

The machine marks the Nonstop series' first use of proprietary chip technology and is intended to strengthen Tandem's position relative to IBM at the high end of the on-line transaction processing sector, according to analysts.

Jeff Canin, an analyst with Hambrecht & Quist in San Francisco, said last week that Tandem's ability to increase the performance of its existing line had been in question, but the technology involved in today's release should resolve that issue.

At the CPU's heart lie 31 Motorola Semiconductor Products, Inc. A2800 ALS gate arrays, the same technology that forms the foundation for Data General Corp.'s recently announced MV/20000 superminicomputer. Roughly comparable in switching speed to emitter-coupled logic, the gate arrays reportedly reside on Motorola-produced wafers that are later shipped to Tandem for customization.

At Tandem's own in-house very large-scale integration fabrication facility, the wafers then receive their last three layers of metalization and have their gates connected, according to Omri Serlin's "FT Systems" newsletter. Serlin, an industry analyst who specializes in on-line transaction processing, heads Mountain View, Calif.-based Itom International, Inc.

Another feature that will also contribute to the product's throughput is an expected new release of Tandem's Guardian operating system, the newsletter says.

Besides using the Motorola gate arrays, the top-of-the-line Tandem unit incorporates 256K-bit random-access memory chips, the building blocks for the machine's basic memory boards, each of which stores 8M bytes.

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Wyse unveils high-end unit

By Maura McEnaney

SAN JOSE, Calif. — Terminal manufacturer Wyse Technology, Inc. today is scheduled to introduce a high-end version of its ASCII terminal that provides more display lines and an increase in local display memory over its previous products.

According to Wyse, the WY-60 was designed for sophisticated users who want increased functionality in their terminals. The product also is aimed at users of multiuser systems who employ a personal computer as the CPU.

Priced at $699, the WY-60 supports either a standard Wyse keyboard, IBM Personal Computer AT keyboard or IBM 3161 terminal keyboard.

On-board memory has the capacity to handle seven pages of local display memory. Wyse also announced that it will continue to support, but will no longer market, the $699 WY-50+, introduced as an interim product last year.

The WY-60 gives users a choice of 44 or 26 display lines in an 80- or 312-col. format. Available immediately, the product has a 14-in. flat screen and a character resolution of 7 by 12 pixels in a 10- by 16-cell matrix. The WY-60 also permits additional character sets to be downloaded from the host to local memory.

GSA's software center to become reseller

WASHINGTON UPDATE
Mitch Betts
CW Washington Bureau

In an unprecedented action, the Federal Software Management Support Center recently announced that it plans to become a third-party reseller of software tools to its government clients.

The center, the part of the U.S. General Services Administration that provides software services to agencies on a cost-reimbursable basis, recently issued a draft bid document outlining its plans.

The center plans to turn its programmer's workbench demonstration project into a full-fledged service.

It seeks to obtain the distribution rights for 11 types of IBM-compatible software tools for Cobol programmers, such as a translator tool, a reformatter tool, a data standardization tool and a documentation tool.

■

The National Science Foundation plans to reorganize and consolidate its computer research programs into a single directorate, with funding of about $120 million in fiscal 1987, according to a budget report that was released by the Institute for Electrical and Electronics Engineers, Inc. (IEEE).

The IEEE report said the directorate would consist of the computer division of the mathematics and physical sciences directorate, the information science and technology division of the biological and social sciences directorate and the computer and computational engineering divisions of the engineering directorate.

At a recent IEEE budget briefing, Carl W. Hall, a foundation official, confirmed that a directorate for computers will be created in the next few months, funded at about $100 million.

■

Revisions to original software can obtain copyright protection if the revision's author submits 50 representative pages of the revised computer program for registration, the U.S. Copyright Office ruled recently.

The rule was included in a package of regulations clarifying the office's deposit rules, which require authors to deposit their works at the Library of Congress in order to register for U.S. copyright protection.

The copyright office retained the current requirement that the first and last 25 pages of the original program be deposited.

For programs of 50 pages or less, deposit of the entire work is required.

The copyright office announced that it has not yet decided how to provide copyright protection to commercial data bases that are constantly undergoing change [CW, June 24].

■

The U.S. General Accounting Office (GAO) recently disclosed that its fraud hot line uncovered a case in which two federal employees used a government computer to prepare documents for a private business venture.

The GAO reported that an anonymous telephone caller accused employees of the National Oceanic and Atmospheric Administration of the action, which was later substantiated.

Both employees were reprimanded, and their supervisor "obtained a commitment that there would be no further misuse of government equipment," the GAO said.

The toll-free hot line has logged more than 74,000 calls during the last seven years, resulting in 1,349 substantiated reports of improper conduct, GAO said.

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VIEWPOINT

EDITORIAL

Computers aren't the issue

The 1984 tax act, passed by a Congress trembling with election-year deficit sensitivity, directed the Internal Revenue Service to undertake a two-year pilot program matching information in its tax-return data base against names of welfare recipients and student loan deadbeats. The idea in the first instance was to identify aid program participants who hide interest and dividend earnings and, in the second, to withhold tax refunds from individuals who have defaulted on government-backed student loans.

Implementation of the program has met with protest from the IRS, which contends that it threatens the tax structure's foundation of voluntary self-assessment, and with condemnation from civil libertarians. The latter feel the pilot program is a precursor to establishment of a national data base that would threaten individual rights. "Today, a de facto national data center is being created by this authority and modern computer technology," charges Jerry Berman, the American Civil Liberties Union expert on privacy and technology. "The spectre of a giant mainframe has been replaced by decentralized record systems that can be brought together through computer links as if in one room."

Berman apparently knows something about local-area networks that the rest of the world doesn't. In his rush to raise the threatening spectre of Big Brother and tag computer technology as the culprit, Berman not only sails right over some serious data communication gaps but goes off in the wrong direction entirely. Computers aren't at the core of this issue, and it serves no useful purpose for anyone to rail against computer technology.

What *is* at the core of this issue is the question of what personal data the U.S. government is going to gather and store, who is going to have access to this data and for what purpose. Those are weighty questions, ones that computer professionals — not to mention the ACLU — must take seriously.

We've never been a big fan of presidential blue-ribbon commissions, but the subject of national data bases and their use by federal government agencies is certainly one worthy of such attention. And, given this administration's avowed commitment to the cause of individual liberty, Ronald Reagan seems just the president to create such a commission.

Notes & observations

We have *The New York Times* to thank for the news that, early in March, there occurred what "were apparently the first computer break-ins on Capitol Hill." The word "apparently" is key. Two U.S. representatives are claiming that unknown outsiders were able to access their office computer systems and destroy letters and mailing addresses. "Every office on Capitol Hill can be broken into in this way," said one of the purported victims. But a spokesman for the firm that provides office systems on Capitol Hill (systems that operate independently of each other, by the way) maintained that it would take a password, two security codes and "a Ph.D. in math or computer science" to enter the computers in the manner alleged.

Sounds like the start of another scare campaign to us: First they license all our guns, then modems.

LETTERS TO THE EDITOR

Keeping tabs on ATM debit cards

A recent article "Banks, retailers hope to cash in on consumer debit cards" [CW, March 10] raised the question of consumer acceptance of the use of debit cards for making purchases.

I feel compelled to point out that debit cards don't offer the same protection to the consumer that credit cards offer. If a credit card company bills you for something you don't owe, you send that company a written explanation and you don't send the money. You have some time to deal with the situation in a manner prescribed by law. However, if something goes wrong with your debit card, your whole account could be cleaned out, and it would be up to you to prove to the bank that they should give you your money back. Even if you are successful in doing this, it could take a while to get the matter cleared up and regain access to your funds.

I think the banking system has a long way to go in its effort to build consumer confidence in the various automatic teller machine systems. Problems include lack of system availability, ATMs that "swallow" cards for no justifiable reason and inaccuracy. I even experienced a situation in which an ATM incorrectly debited my checking account for $400. I eventually got the money back, but I've monitored my transactions very carefully since then.

Alida M. Jatich
Chicago, Ill.

Charting in-house consulting waters

The article "Exploring new DP frontiers with in-house consultants" [CW, March 17] stated there was no downside to having a DP professional serve as a personal consultant to a user by being stationed in the user area.

My company is doing just that. Some of the questions we are having include the following:

Will the user who knows nothing about the DP professional's job give him his performance reviews, or will they be done by the DP manager who doesn't know what kind of job he is doing?

What kind of reputation will that person have in the DP shop when he hasn't been around to build one?

How will the information received while talking over coffee be passed along?

The farther away a user is from the DP department — a different floor, a different building, a different city — the more these problems are magnified.

Marsha Rogers
Analyst/Programmer

Longer lines mean more customers

The article, "Cullinet exec out in shuffle," dealing with recent changes at Cullinet Software, Inc. [CW, March 17] inferred through the remarks of a manager of data access systems that technical expertise on the part of the IDMS vendor's support personnel has "decreased significantly over the past five years."

Perhaps the quoted manager may have intended to mention that with a larger user base, Cullinet may not have been as responsive to user problems because of a more thinly spread technical staff. I suppose it may be perceived by some that nonavailability of help is equivalent to nonskilled help. To me, when the line of folks waiting for service grows longer, it's not a clear indication of quality slippage — just more customers.

I cannot imagine that Cullinet would be naive enough to assume it could afford relaxation on the technical support front. Indeed, a lull in sales activity might provide ample opportunity for the vendor to develop even better support logistics.

In the meantime, problems with regard to the care and feeding of IDMS software continue to be addressed by the users themselves with appropriate and credible assists from Cullinet. I am not aware of any incidents where a user was placed at risk as a result of either lack of experience or unwillingness to respond.

John E. Bruno
Assistant Vice President
Systems Development
Dean Witter Reynolds, Inc.

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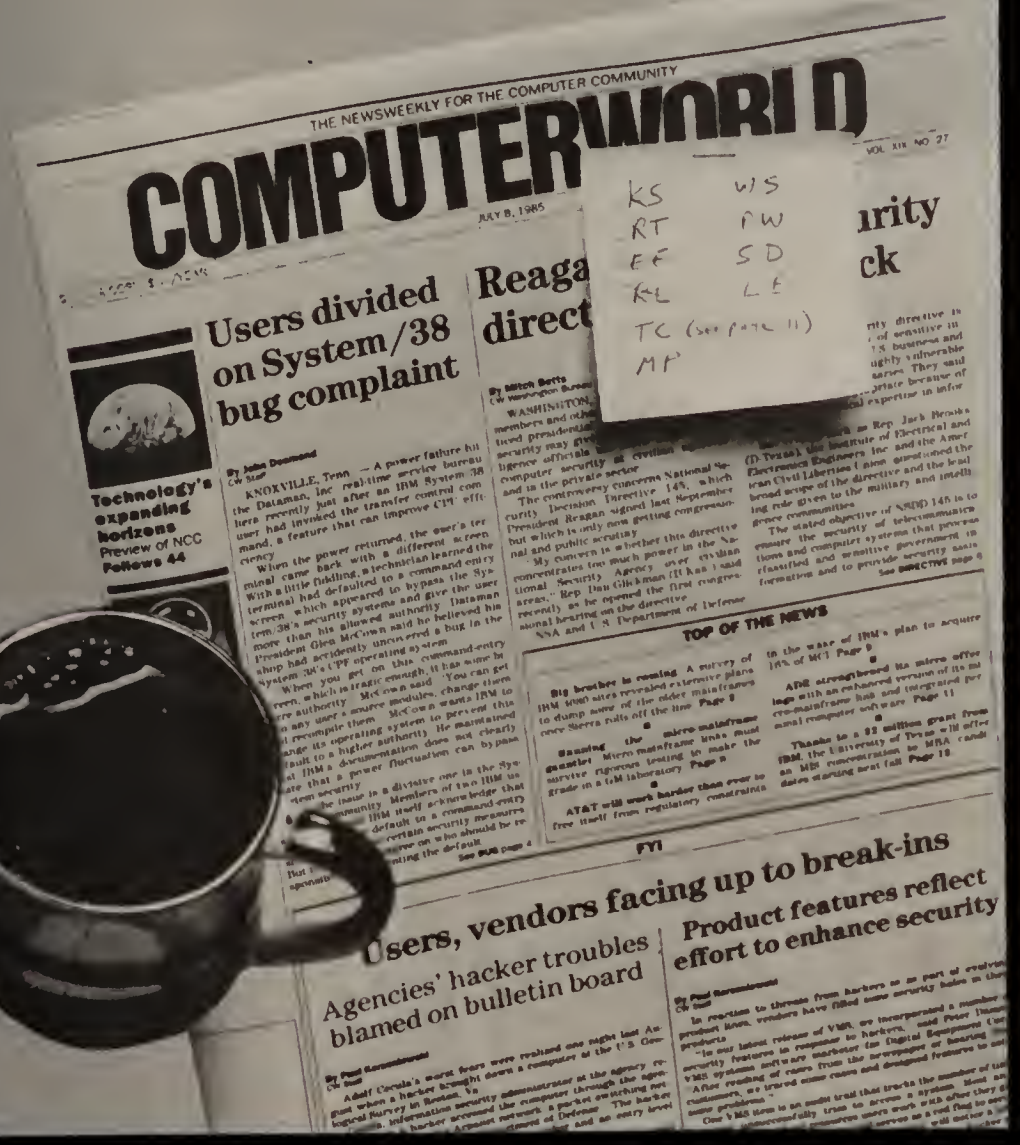

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VIEWPOINT

An unenhanced view of Halley's comet

By CHARLES P. LECHT

Halley's comet is but one of the smaller moving parts to be found in the vast collection of those visible in our skies and contained within our solar system. In comparison with most of the others, it would be unworthy of our notice were it not for the fact that it nearly slams into earth every 76 years.

Halley's comet has been visible to just plain folks with relatively inexpensive binoculars in places like North America and Japan from early September through January when it was in the final moments of its race towards perihelion — the point on its orbital path closest to our sun. Since actually seeing the comet is said to be a once-in-a-lifetime event, those who took to the nighttime skies this fall expecting to see a celestial spectacular were sorely disappointed. They saw little more than a dirty roundish smear.

Even America's growing community of professional astronomers armed with sophisticated and costly telescopic gear could see little more, thus the remark of Fred Whipple of the Smithsonian Astrophysical Observatory in Cambridge, Mass.: "I think it looks like a dirty snowball." And for those scientists who spent millions of dollars, pounds, kopecks, francs, lira and what have you to send astronomically expensive satellites into space to take a closer look at Halley's comet, the reward was the same. "It's black," one European scientist was heard to utter.

Yet all the photographs of Halley's comet to which we are witness this year are so enhanced by computer systems that they bear little resemblance to what one actually sees when viewing the comet. With the emergence of computer-driven graphics systems that possess the capability to enhance the imagery they may capture to convey incredibly deceptive messages, the chance for grandiose mischief is likewise enhanced.

LECHT ON SCIENCE

"

Computer-driven graphics systems possess the capability to convey incredibly deceptive messages.

It would be unfair to chastise the trained astronomer who in his enthusiasm for the celestial drama of Halley's comet electronically retouches the images he captures to convey better his joy over the event.

But there is a limit to how much retouching should be allowed, and once that limit is exceeded a retouched photograph should be renamed.

Of course, many magazine and video pictures being shown today contain the legend that these are enhanced images of the comet, but some of these make the comet appear to be the subject of split-second photography that captures a bullet shot from a high-powered rifle and freezes it mid-way to its target or a hot, roaring Twentieth Century Limited railway engine 6-km across and snorting a trail of fire and brimstone for as far back as you'd care to imagine.

The creation of faked photographs to convey deceptive messages intended to leech viewers of hard-earned cash doubtless may be traced to the invention of photography. But until recent days, even an amateur could tell the difference between the real thing and that which was contrived from it. This was because of the analog (as opposed to digital) recording methods used, the characteristics of the emulsive media and granularity problems in the print.

Changing a photograph without leaving telltale traces was beyond all but a very few of us.

And, until recently, the digital recording of pictures was so bad that these presented a Seurat-like image of what they intended to convey. (Georges Seurat, noted French pointillist, may have been the world's first digital image recorder.)

But times have changed. With the emergence of high-speed digital computers, the likes of which are ubiquitous today, digital picture recording methods are capable of producing far better quality pictures than could be achieved using traditional analog methods.

With the trend to record pictures using both technologies, analog as well as digital, results are being obtained that surpass, in quality, anything that may be achieved by either alone.

The capture and sorting of ever-larger data bases to represent pictures propels us toward the day when we may reproduce reality with ever more accuracy.

But this also provides us with the means to alter reality with ever-increasing deceptiveness so that a true image and its alteration may become indistinguishable by sight alone. This, in conjunction with enhanced animation and sound facilities, could wreak havoc on our senses.

Little harm may result from the blizzard of enhanced comet pictures that continues to fall on us this Halley's comet year. Some good may even come of it — an increased awareness of space at a time when America's life may well depend upon what we do in it.

But one cannot help but wonder what we are in for next in the world of image enhancement possibilities and whether we are ready for it. Halley's dirty snowball, still barely visible in our Northern Hemisphere throughout April, can be seen from our Southern Hemisphere through June.

Lecht is chairman of Lecht Sciences, Inc., a New York-based think tank specializing in computer technologies. He divides his time between Tokyo and New York.

Relational rules need not dictate DBMS purchases

By JOHN S. MASLANKA

The second of two *Computerworld* articles [CW, Oct. 14 and 21] by E. F. Codd has become a source of great controversy. This article provides numerical tests of how well various DBMS products conform to his 12 relational rules.

The real losers in this grading scheme will be those DBMS users who are not certain of their positioning in the field, and when they see such a pronouncement, they will shudder and think a potentially costly question, Should I switch DBMS products?

The following four things are clear about relational DBMS systems:

- They are one of the two major types of DBMS systems commercially available. The other is the network or Codasyl system, the subject of an American National Standards Institute (ANSI) standard since 1971.
- At the current time, there is no national or international standard for relational DBMS. However, one is currently being formulated by our own ANSI.
- Codd first described the relational data base model in a 1970 article that contained the nucleus of the relational concept, involving normalization and the tabular approach to structuring data. All material concerning data sublangauges, views, integrity and security that have been tied into the relational model are subsequent accretions and refinements.
- Relational DBMS have only come into popular use since about 1982. At that time more powerful mainframes and data access methods were introduced that made them feasible. Previously, they were regarded as interesting but prohibitively expensive. In the meantime, many data base users became accustomed to other data management methods and products.

READER'S PLATFORM

If you are a DP manager, you certainly are entitled to have concerns about your current DBMS package. Even though there are only two major styles current in the marketplace, there are numerous individual DBMS packages available and competing with each other for your attention.

National standards have proven to be sufficient in the past if you wish to consider the conceptual aspects of how these packages relate to the data model that you have constructed for your organization. However, experience has shown that across the spectrum of standards that apply to data processing products, the standards do not guarantee uniformity within or among these products.

In addition to your budget, what, then, should be your criteria for judging and selecting DBMS products? There are three major groups of criteria that are fairly standard in the software procurement area.

First, does the package fulfill your current and future data management needs, at least fairly closely? Does the package concur with your organization's data model? Is there room for growth with the package? If there are gaps in its functionality, can your staff fill them or work around them without incurring large expenses? Are there undesirable side effects, and can they be remedied in your establishment?

Second, does the person or organization from whom you are acquiring the product have a good reputation? You should ascertain their ability to support the product. Will they allow you a trial or demonstration period before you purchase? Do they service the product promptly and reliably? Do they provide support on a regular basis, including update versions and advice on technical usage? Service and support agreements should be carefully written into contracts.

Third, is the product well documented, and does it function according to that documentation? The documentation is what gives the product its true sense of credibility. The user manuals should say in detail what the product does and should say to some extent what the product does not do. The importance of national standards comes to the surface in the documentation. A DBMS cannot claim to be Codasyl if it cannot do recovery after a failed transaction. You should ascertain whether a major feature such as this is available before investing in the package because such a product would be very difficult to use in a commercial or industrial environment.

The DBMS guru has spoken. Codd has made a controversial pronouncement that would incline our attention toward a style of DBMS and within that toward a specific product. The product certainly is intrinsically useful for the type of data management task for which it was designed.

But, as we have seen in the above discussion, this is not the only reason to consider adopting a DBMS product. In addition, we must consider its potential suitability and usefulness for the particular environment and data management requirements of our organization. The other side of this coin is not covered in Codd's articles, which leaves them in a very one-sided state.

Maslanka is a professor of computer science at the Boston College School of Management.

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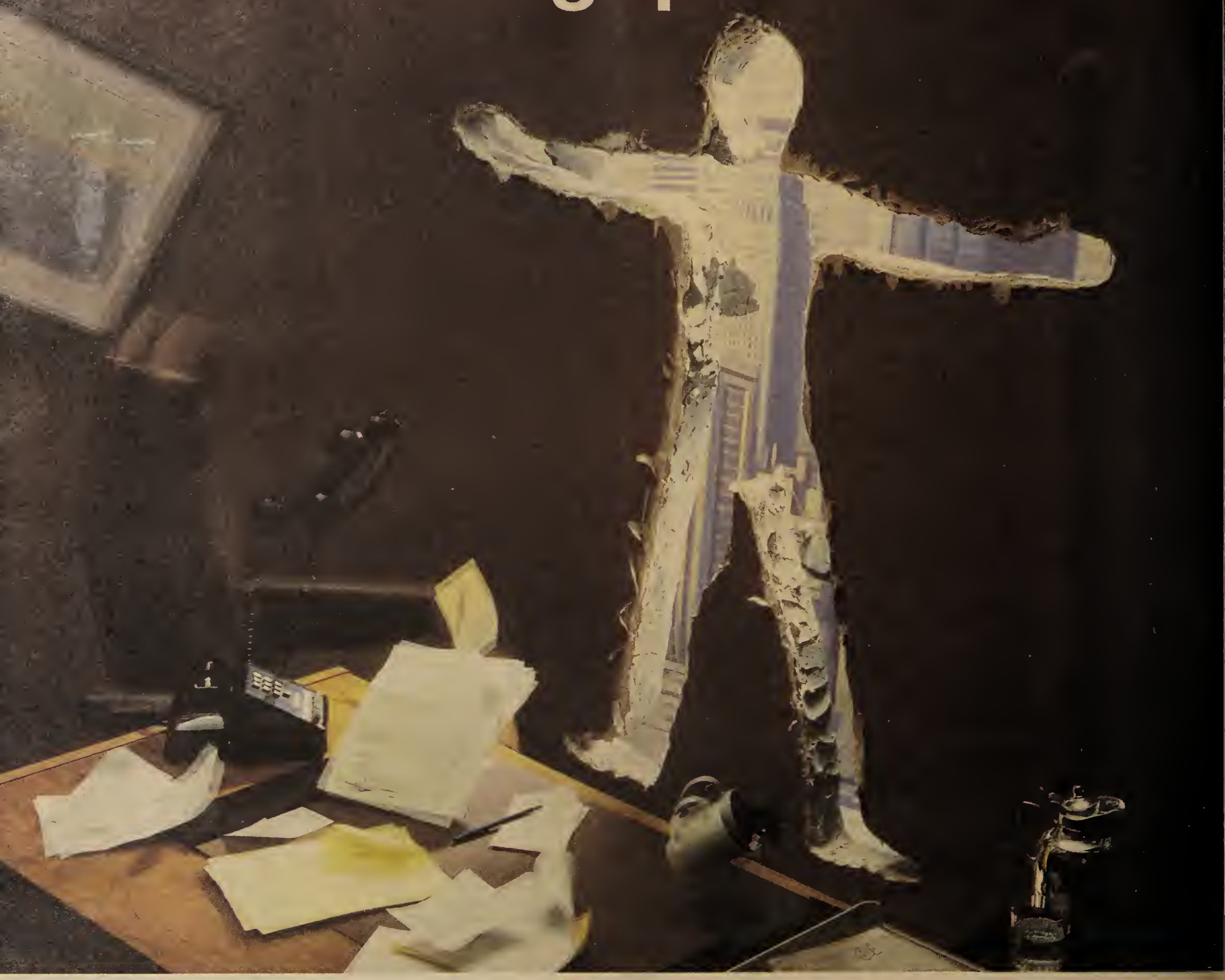

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DATA STREAM
Daniel Rosenbaum

AT&T fortifies telecom arsenal

AT&T, suddenly needing to defend itself from swarming competition in every phase of its business, is starting to fight back with services that may ultimately change the structure of the communications industry.

The meat of the communications business is not the great masses of $5/month residential users, whom AT&T has sworn before the U.S. Congress to serve until chipmunks nibble every piece of copper loop into oblivion. The money is made on a small percentage of the market that makes lots of calls. In the residential and small-business market, that segment is defined as those who charge more than $50/month in long-distance calls. In the large-business market, the figure is in the neighborhood of $5,000 to $10,000; AT&T says a large business is any company with more than 80 lines.

AT&T started out by offering the world pretty much more of the same, trying to beat the competition with the AT&T name and image. But the free ride for smaller competitors is over. In the last year or so, the company has been introducing an impressive array of new equipment and services aimed at high-volume users in the U.S. and abroad.

The unprepossessing start was the residential "Reach Out America" tariff. Large-business customers had been given block-of-time discounts for some years in their WATS and 800 services;

See **AT&T** page 32

Rosenbaum is chief operating officer of Winston/Smith Associates, publisher of industry newsletter "Wiretap."

Unusual allies define CEI

Competitors compromise while others still debate

By Elisabeth Horwitt

Industry debate about the whys and hows of Comparably Efficient Interconnection (CEI) recently intensified when a new CEI proposal was submitted to the Federal Communications Commission by an unlooked-for consortium: IBM, Pacific Bell and Tymnet/McDonnell Douglas Network Systems Co.

The joint filing represents significant compromises, especially on the part of Pacific Bell, industry observers say. However, other carriers made it clear they are not yet willing to make the same concessions.

CEI, as defined by the IBM/Pacific Bell/Tymnet alliance, dictates that dominant carriers, such as AT&T, the regional holding companies and their divested Bell operating companies, would have to supply other enhanced service providers with customer access that is comparable to their own customer connections in terms of quality, functionality, transparency and cost.

The FCC is currently considering different versions of CEI as a potential solution to the problem of how to allow dominant carriers to sell enhanced services and at the same time prevent them from using high customer-access charges to price their competitors out of the market.

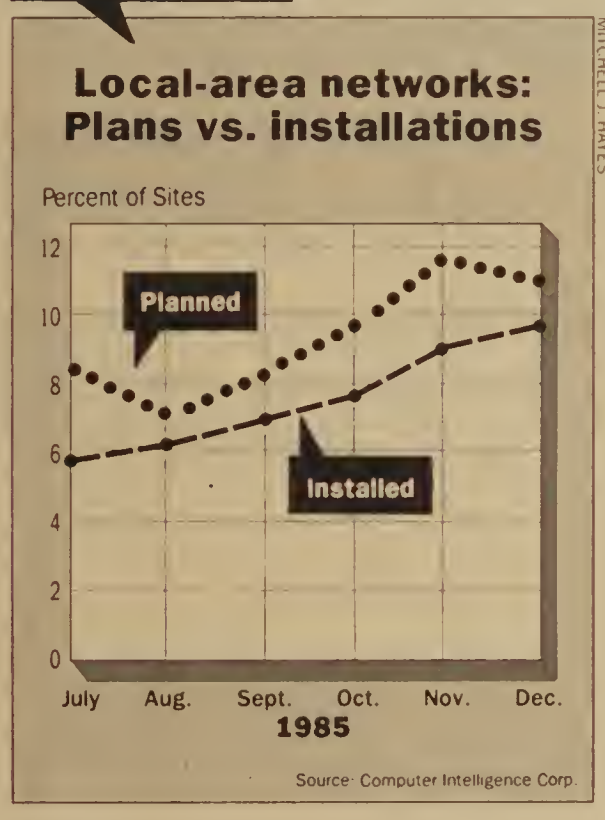
The joint filing also defines how transmissions can be routed from customer premises to "the provider chosen by the subscriber" over the Integrated Services Digital Network (ISDN) D channel.

The IBM/Pacific Bell/Tymnet task force's goal is "to help the FCC tackle the problems and arrive at an agreement about the definition of CEI," said Tymnet President Warren L. Prince.

As future competitors, enhanced service providers, regional holding and local operating companies have consistently disagreed on how — and if — CEI should be implemented, which makes the IBM/Pa-

See **UNUSUAL** page 20

DATA VIEW



Bridge crosses into PBX mart

By Elisabeth Horwitt

MOUNTAIN VIEW, Calif. — A data switch that reportedly combines local networking features with data private branch exchange prices was announced recently by Bridge Communications, Inc. With the Lanswitch/1 (LS/1), Bridge has expanded beyond its primary Ethernet local-area network product line into "direct price competition with data PBX manufacturers," said President William Carrico.

Priced at approximately $250/port when all ports are being used, LS/1 interconnects up to 64 terminals, printers, modems, host ports and other asynchronous RS-232-based devices. Devices can communicate over twisted-pair connections to the LS/1 at rates of up to 19.2K bit/sec. LS/1 also can act as a gateway to a baseband

See **BRIDGE** page 28

NEW THIS WEEK

- Paradyne announces a varied product offering
- For more on this and other new products, see pp. 91-117.

INSTANT ANALYSIS

"The Federal Communications Commission likes to have people solve their own problems."

— Warren Prince, president of Tymnet, Inc./McDonnell Douglas Network Systems Co.

Racal-Vadic, Microcom offer dial-up net control systems

By James A. Martin

ATLANTA — The emerging dial-up network control system market gained momentum with the recent introduction of products from Racal-Vadic and Microcom, Inc. The products offer dial-up network management and error control on a level that previously was attainable only on leased-line networks, company spokesmen said.

"Customers are demanding more control on dial-up circuitry," said Gregor N. Ferguson, vice-president of marketing for Microcom of Norwood, Mass. "We are moving as quickly as possible toward offering true alternatives to leased-line applications."

Microcom's recently unveiled High Density Modem System (HDMS) will begin shipping this month. It is based on the rack-mounted HD/Chassis, retailing for $1,599, which supports up to 32 Microcom HD/2400 or HD/2400C dual-modem cards. The HD/2400 is said to offer data throughput of up to 2,900 bit/sec. and costs $1,349. The HD/2400C delivers up to 4.8K bit/sec. in throughput, through data compression, and retails for $1,599. Both modems support AT&T Bell Laboratories' standards for 300 bit/sec. and 1,200 bit/sec. transmission, as well as CCITT V.22 and V.22 bis standards.

The HDMS is available with two types of controllers. The Intelligent

See **NET** page 32

Vendors, contractors, designers unite to form Intelligent Buildings Institute

By Mitch Betts

WASHINGTON, D.C. — A group of hardware and software vendors, designers, developers, contractors, consultants and building managers recently formed the Intelligent Buildings Institute as a professional association and promptly announced that their first task is to find a definition for "intelligent building."

Richard Geissler, executive director of the Washington, D.C.-based institute, said that "until the building community agrees on a definition, it will face problems in reaching agreements on technical requirements, responding to government regulatory attempts and developing end-user enthusiasm for the new building technologies."

"There are a number of companies and individuals who have been quoted as saying they are building or operating an 'intelligent building,' yet the building community has not agreed just what that means," said Ronald J. Caffrey, vice-president of Johnson Controls, Inc. and acting chairman of the institute's board.

Caffrey said that the institute hopes to answer questions that are continually being asked about smart buildings, such as, How intelligent? What level of intelligence? What systems are included?

Caffrey said that, according to the association's preliminary definition, an intelligent building integrates various systems — such as voice and

See **SMART** page 28

Unusual allies define CEI

From page 19

cific Bell/Tymnet alliance an important breakthrough, said Daniel Rosenbaum, chief operating officer of Winston/Smith Associates, publisher of the newsletter "Wiretap." Pacific Bell is giving away "a chance to choke off competition" in the enhanced services market, Rosenbaum said. "The regional holding companies are clearly in the driver's seat when it comes to local-loop access," he added. "Maybe Pacific Bell doesn't think it can keep Tymnet out of the local market."

Tymnet's Prince said that both sides have made concessions. "Instead of 'I'll give you this if you give me that,' Pacific Bell said, 'We understand you think we telcos will freeze you out of the business,' and we said, We understand that you can't fill every service provider's request and remain profitable.' "

> ***"AT&T shares the goals of key industry participants in developing a definition of CEI for enhanced services. However, we don't support the "ex parte" filing by IBM, Pacific Bell and Tymnet."***
>
> — AT&T official statement

Pacific Bell reportedly has taken on the job of getting AT&T and the other regional holding companies to agree to the proposal. "There was no deliberate exclusion; we are now seeking to broaden the group's scope," said Steven Harris, executive director of Federal Regulatory Procedures at Pacific Bell.

But other carrier representatives say that their companies are far from ready to adopt the IBM/Pacific Bell/Tymnet proposal as it now stands.

"AT&T shares the goals of key industry participants in developing a working definition of CEI for enhanced services," an AT&T spokeswoman said in an official statement. "However, we don't support the 'ex parte' filing by IBM, Pacific Bell and Tymnet."

AT&T's major objection to the filing is that it could be interpreted as applying CEI regulations to AT&T. In a recent FCC filing, AT&T claimed that it should be exempt from CEI rulings because, unlike the divested Bell operating companies, AT&T does not control "bottleneck" facilities — links to a customer base that cannot be duplicated by other service providers.

AT&T also objects to the portion of the recent joint filing relating to the ISDN D channel. "AT&T firmly believes that regulatory principles should not be keyed to a specific implementation, sueh as ISDN, because this inhibits further innovation in the evolving technologies and interfaces," the company's spokeswoman maintained.

Further objections were raised by Bell-Atlantic Corp., a regional holding company that has already obtained FCC approval to offer packet switching services in some areas. "CEI will be achieved when we hand off to an enhanced service provider roughly the same cost that we charge ourselves for customer access, taking certain differences into consideration," a Bell Atlantic spokesman claimed. The differences are the regional holding company's major concern, he added.

The filing's cost/pricing section advocates "pricing equality," which dictates that if co-location is not feasible, the local operating company and the service provider share the cost of moving customer transmissions from the operating company's networking facilities to the provider's access node. Tymnet's Prince claimed Pacific Bell has even agreed to "pay a little higher than half of the average cost."

Handing over savings

Bell Atlantic, however, wants access charges "to reflect the cost of interconnection," the spokesman said. "If we save money by running networking and data processing applications on the same system, we don't want to hand on those savings to a competitor."

The regional holding company also objected to the fact that the filing defines packet switching as an "enhanced service" and defines the holding companies' customer-to-service-provider connection as "a transparent bit stream." This prevents the operating companies from offering — and charging for — packet switching connections between customers and service providers. As Prince admits, this is exactly the way packet switching service providers like Tymnet would like it. "We don't want the Bell operating companies to convert customer transmissions to X.25; we can do that ourselves."

One of Tymnet's major priorities is getting the FCC to choose CEI over co-location, Prince claims. "A lot of user organizations say co-location is the answer, but the telcos don't want it, and neither do we. It would mean that the telcos would have to maintain each service provider's networking facilities on their own premises. Service providers would end up competing for limited space, and there are security considerations as well: I don't want to give my competitors the chance to throw iron filings on my box."

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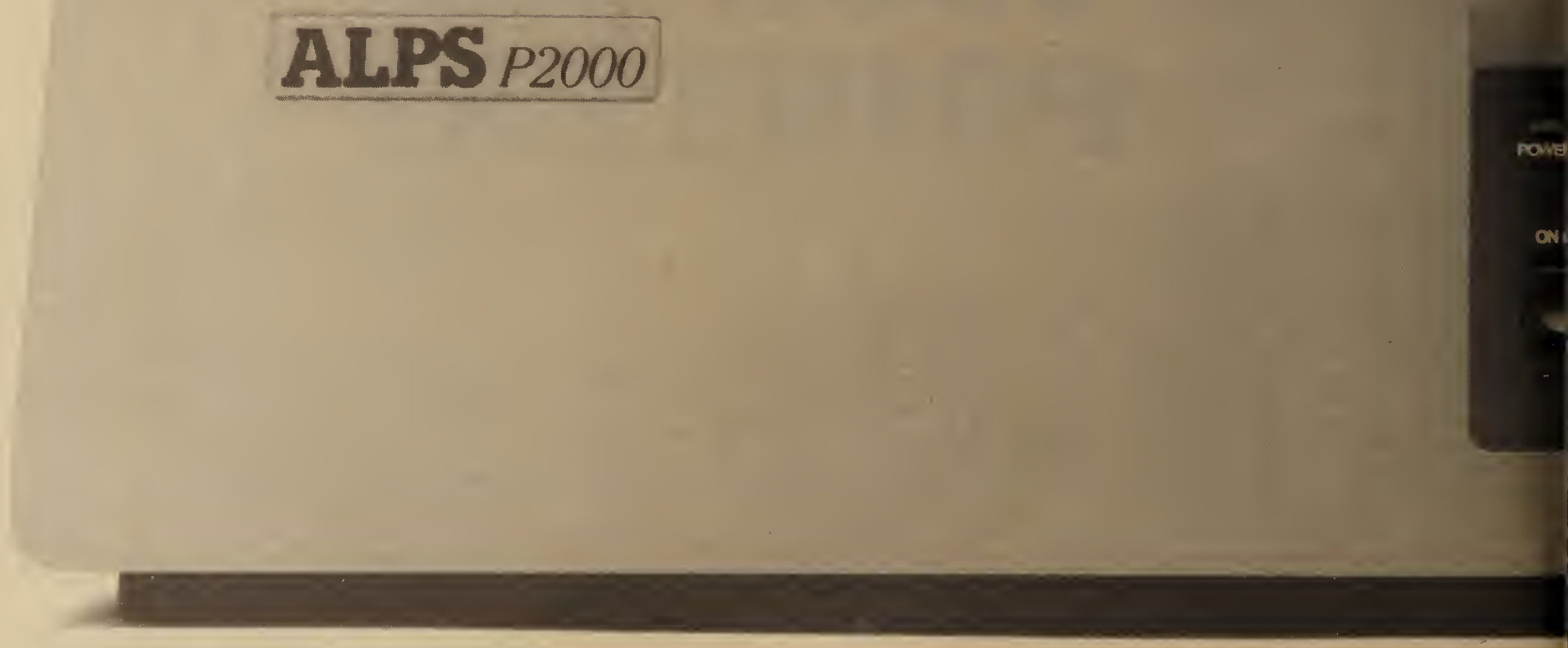

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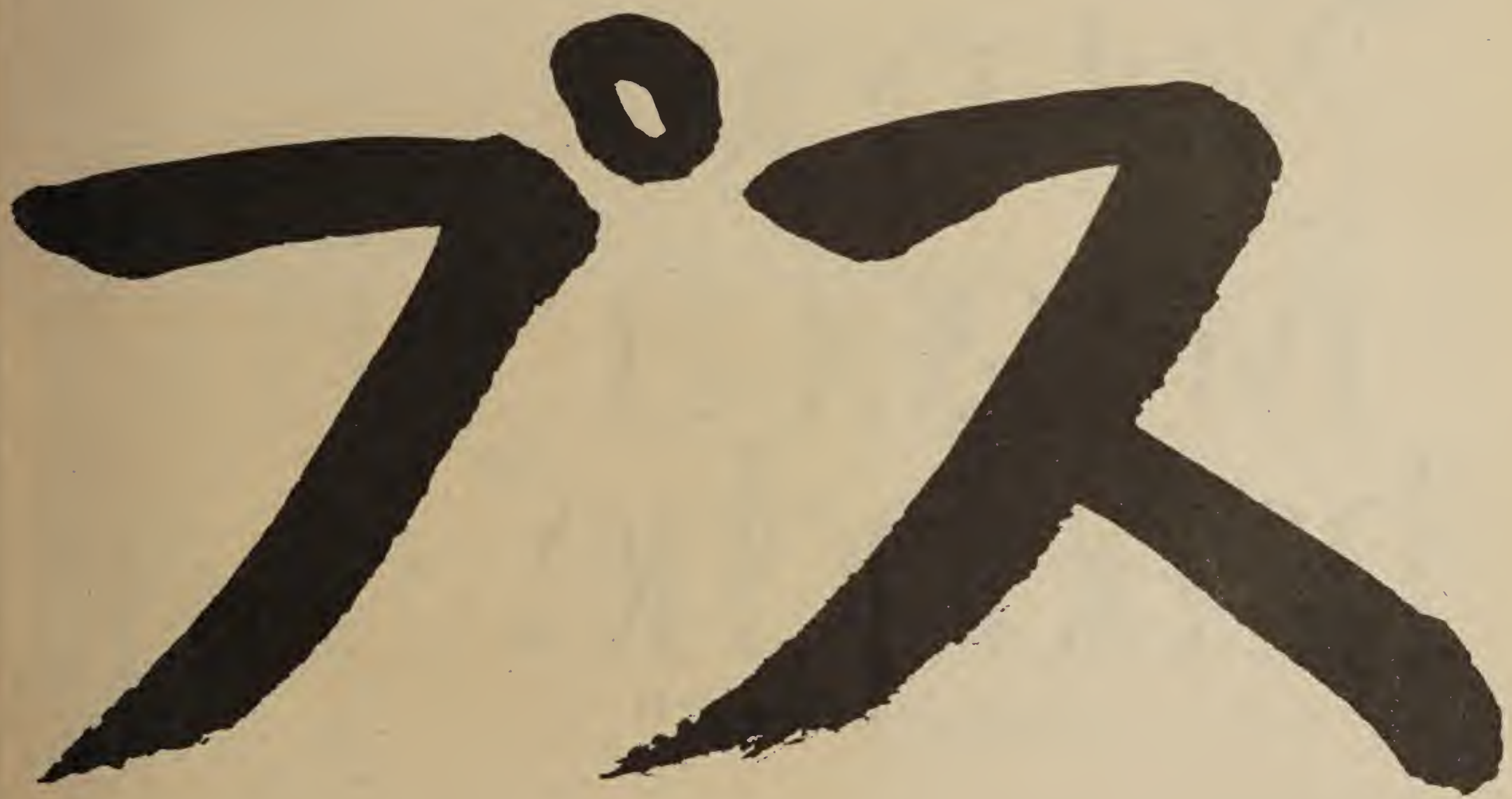

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ALPS
AMERICA

Bridge crosses into PBX mart

From page 19

Ethernet local-area network that supports speeds of up to 10M bit/sec., according to Bridge's Executive Vice-President of Research and Development Judy Estrin. LS/1 also supports IBM or Digital Equipment Corp. wiring schemes, she added.

"You could install an LS/1 in each wiring closet, link terminals to each LS/1 via twisted-pair and then link LS/1s over Ethernet," Estrin suggested. "I know of customers with wiring closets whose eyes lit up when they heard about LS/1."

Through the Ethernet connection, users have access to Bridge gateways to other communications environments such as IBM's Systems Network Architecture and CCITT's X.25. They also can maintain multiple concurrent host sessions, a capability not offered by most data PBXs.

'No big deal'

"Technologically, the LS/1 is no big deal," said Terence Bentley, analyst at Boston-based Yankee Group. "Basically Bridge took the Communications Server/1, which supports four eight-port RS-232 cards, and replaced them with four 16-port cards that support twisted-pair wiring." He added that a terminal must be equipped with a $10 to $15 RS-232 adapter before it can be linked to the LS/1.

"It's useful as a low-cost way to tie a bunch of asynchronous terminals together with twisted-pair instead of the more expensive RS-232 or IBM 3270 coaxial cable: You can pop the LS/1 into a wiring closet and leave it there.

"The LS/1 won't walk over data PBXs," Bentley said. "If you have an Ethernet, LS/1 saves you from buying a data PBX as well. But it lacks some data PBX capabilities such as high-speed synchronous host connections."

Bridge's Estrin admitted that LS/1 data rates are not sufficient for some personal computer users' needs. She said that "19.2K is fine for PCs that are used either stand-alone or as mainframe terminals. But personal computer users who perform a lot of file transfer and peripheral sharing may want a direct Ethernet connection, such as 3Com Corp.'s Etherterm." Bridge has an agreement to resell Etherterm boards.

Scott Haugdahl, senior systems specialist at Minneapolis consulting company Architecture Technology Corp., called LS/1's $250/port price tag "pretty low," adding that Bridge has "a lot of experience with asynchronous batch communications. They can do packetizing, buffering and other things to optimize bandwidth and network performance."

Price advantage

While LS/1 is "extremely cost-effective compared with data PBXs for strictly RS-232 connections," customers may lose that price advantage when they start adding new features and terminals, Haugdahl added. "With a data PBX, you can add 3270 or X.25 connections just by inserting a board in an expansion slot; with Bridge you have to buy an entire new system."

LS/1's 64-port upper limit is another potential drawback, Haugdahl said. "To expand the number of ports, you have to add another LS/1, and you need that high-speed Ethernet backbone to connect the two, so it gets expensive."

Haugdahl said he did not know of another PBX-to-Ethernet networking product comparable to LS/1. Micom-Interlan, Inc., a merger between data PBX vendor Micom Systems, Inc. and Ethernet board company Interlan, Inc., "should have produced a comparable product by now," Haugdahl said.

Available in third quarter

Micom-Interlan Vice-President David Potter said that the company will have an Ethernet-to-PBX connection by third-quarter 1986. "Right now, Micom's data PBX can only connect to Ethernet through Interlan's terminal server, so users have to log on three times: to the server, to the data PBX switch and then to whatever host they're connecting with. Anyone's data PBX could do that with an Interlan board." He added that the new product will provide cleaner connections.

Bentley predicted that Micom-Interlan's future connection, based as it is on a "true data PBX," will support synchronous, high-speed terminal-host connections as LS/1 does not.

LS/1 supports both Xerox Corp. Network System and Transmission Control Protocol/Internet Protocol networking software. Available now with a 60-day delivery time, it is priced at $16,000. Future token-ring and broadband versions are planned.

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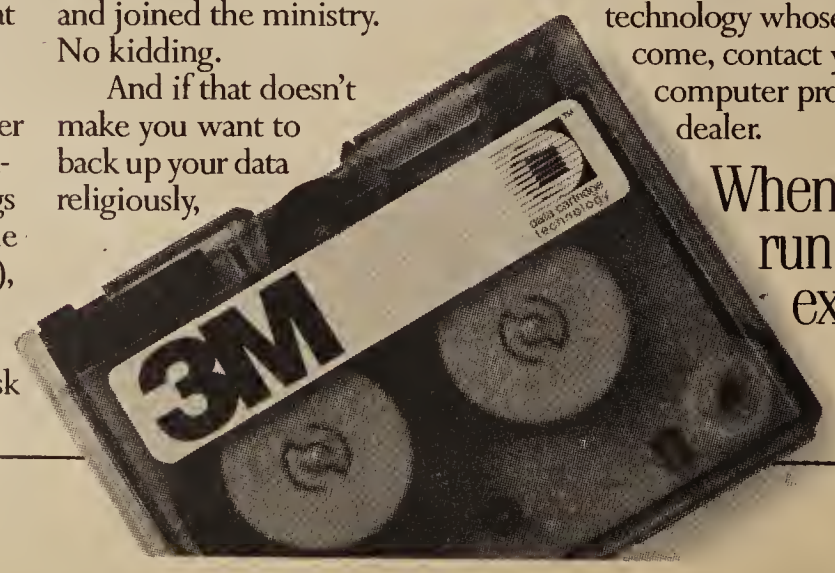

When you run out of excuses.™

Smart buildings group formed

From page 19

data communications, lighting, heating and air-conditioning and other building functions — to promote the productivity of occupants.

A second project currently being considered by the association is the establishment of a training course and certification program for intelligent building consultants and managers.

Edward Rondeau, vice-president of the International Facility Management Association and a member of the institute's board, said the two organizations have formed a task force to work on the training program.

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AT&T arsenal fortified

From page 19

Reach Out was the first time such rates were available for residential customers.

Next was Megacom, a new tariff that benefits the largest WATS users. One new component of Megacom is a shift to a more distance-sensitive pricing structure. The other is the unbundling of local access from the long-haul tariff, technically freeing users to connect into the AT&T network without using the local loop.

AT&T has also refiled Pro America, a small-business application of Reach Out. Presuming the tariff passes Federal Communications Commission muster this time, it will allow small businesses to buy hours of network time at a discount. The service is aimed at companies with bills of roughly $150/month and up.

A strategic move on AT&T's part is to retain discounts for WATS use of more than 40 hours/week but to obtain the FCC's permission to eliminate a further cut for use of more than 80 hours a week. Telephone service bureau businesses, such as hotel and airline reservation services, could migrate to Megacom. But WATS resellers, which make money from AT&T because bulk WATS is far cheaper than regular long-distance service, would get creamed.

The latest piece of the puzzle has yet to be officially announced by AT&T, though its marketing folks are talking about it selectively. Currently called Mininet, the service is aimed at small businesses and high-volume residential customers. With Mininet, instead of being assigned a dedicated line that can only be used for incoming calls to an 800 number, companies would get incoming 800-number calls on a plain old telephone service line that could also be used for regular incoming and outgoing calls. The 800 number would be translated to the telephone service line number. Rates have yet to be firmed up, but figures being batted about indicate the Mininet would be a block-of-time service priced between Message Toll Service and WATS.

AT&T, then, is offering discounts to market segments it used to take for granted while eliminating discounts where they can be used competitively against AT&T. In the process, it is moving toward a tariff structure that will reflect its cost much more closely than is currently the case.

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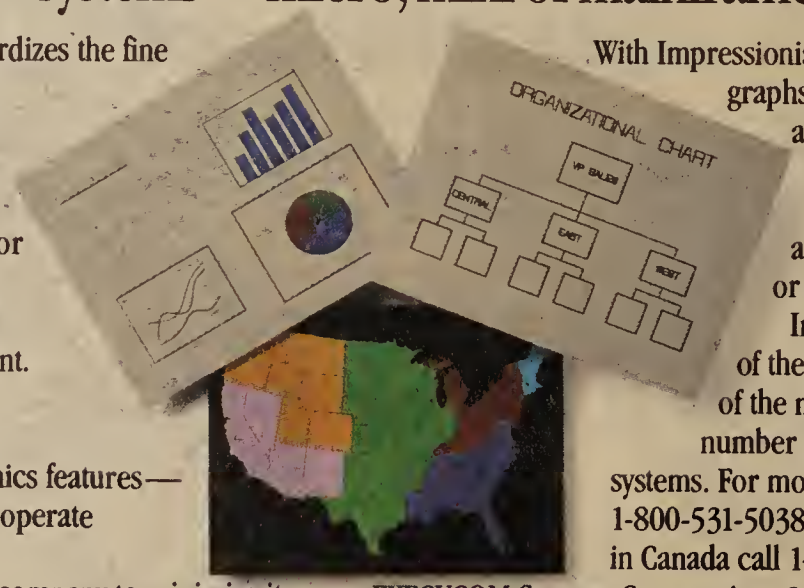

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EXECUCOM

Net control systems debut

From page 19

Network Controller collects operational statistics needed to evaluate the performance of a dial-up network and can compute the number of calls made, their speeds and possible reasons for unsuccessful connections. It retails for $1,499.

The Modem Controller provides verification and status display of Electronic Industries Association leads and costs $199.

Racal-Vadic's dual-modem card, the VA4492E, features eight built-in diagnostic capabilities that include initiate remote test, initiate remote self-test, end-to-end self-test, respond to remote test as well as digital, analog, delayed analog and analog self-testing loop-backs.

"Remote control has become highly important to the future of network management," said Kim Maxwell, president of Racal-Vadic of Milpitas, Calif. "More companies are beginning to need true end-to-end diagnostics and remote capabilities in order to maintain security, change options and determine terminal speeds."

Priced at $1,595, the VA4492E features two V.22 bis, AT&T 212A and AT&T 103-compatible modems that can provide full-duplex synchronous communications at 2,400 and 1,200 bit/sec. They also support asymmetrical, asynchronous mode.

Up to 16 VA4492Es can be mounted on Racal Vadic's Multiple Data Set II network controller chassis, which was first unveiled in July 1985. The modems can be configured for dial-up or leased-line applications and provide error-free data exchange via the Microcom Networking Protocol. Shipment is in April.

SYSTEMS & PERIPHERALS

HARD TALK
James Connolly

Wang enters Microvax mart

Add one more entry to the race for the Microvax dollar, a contest in which Digital Equipment Corp.'s Microvax I took the lead without even defining the course two years ago.

Wang Laboratories, Inc. is the latest competitor in the race, joining DEC, Data General Corp., Prime Computer, Inc. and a host of minicomputer and supermicrocomputer vendors vying for a piece of the same market.

That market is a track that meanders through the world of computer-aided design, scientific workstations, office automation, departmental computing, small business computing and distributed processing. At any given time, the players — including the Microvax — have been described as supermicros, minis, small superminis and deskside systems.

Now Wang is in the race with its VS 5 and VS 6, suitcase-size 32-bit systems that in many instances could substitute for Wang's own VS 15 and VS 65 and in other cases, Wang hopes, could grab for Wang a piece of that distributed processing and departmental market.

To Wang's credit, the company that built its reputation in the office market is avoiding the temptation to say that its new low-end VS systems outperform the Microvax in all situations. While promoting the systems as general-purpose computers, Wang appears to be conceding to DEC the scientific and engineering portions of the Microvax market. In a CPU-intensive Fortran environment, the Microvax easily will outperform the VS 5 and VS 6, one Wang official says.

But Wang is taking a more sensible approach, demonstrating its general-purpose systems in general-purpose environments. When Wang announced the

See **WANG** page 37

Connolly is Computerworld's *senior editor, systems & peripherals.*

Araserve adds applications but saves money with minis

By James A. Martin

PHILADELPHIA — Taking advantage of falling hardware prices, the food and beverage service division of ARA Services, Inc. (Araserve) is planning to replace a time-sharing service with some 300 Honeywell, Inc. DPS 6 minicomputers within the next three years at various locations.

"We are in the process of adding more applications, and as the price of hardware goes down, more locations are able to afford a computer system," said Craig Martin, director of MIS support services for the Araserve division.

Until April 1984, Araserve's food production control system was processed through General Electric Information Services Co. (GEISCO) on a time-sharing basis, which the company had used for almost 10 years. Araserve decided its DP money might be more wisely spent on owning and operating the DPS 6 systems rather than on spending more than $1 million per year in time-sharing costs.

Of the approximately 1,500 Araserve locations in the U.S. and Canada, ranging from corporate cafeterias to school lunchrooms, only 160 currently have DPS 6 systems installed, a figure that Araserve expects to double by next year.

Previously, 80 to 90 Araserve sites were on-line to the food production control system. A typical on-line location was using ASCII terminals supplied by GEISCO and AT&T modems dialing up the GEISCO network at 1,200 or 4.8K bit/sec., depending upon data volume.

At present, some 1,000 Araserve locations process their data manually. Accounting information is mailed in hard-copy format to headquarters, where it is keyed in to an IBM 4381 mainframe.

The DPS 6 systems at each location operate independently with on-site software but can be accessed from the Philadelphia headquarters via 2,400 bit/sec. modems for applications support. The plan calls for each location to be on-line within two to five years with a DPS 6 system in order to input and update company accounting files via remote job entry batch polling on the 4381.

"When you have your own system, you pay a fixed cost, and you have it available 24 hours a day," said Mutu Muthuswamy, director of systems development. "We are now able to use the system more effectively without worrying about the time-sharing costs and can run more applications at no additional hardware costs."

The company chose Honeywell as its vendor because "we wanted someone to take our [software] programs from the GEISCO system and make it work on our own system," Muthuswamy said. "Honeywell was the only vendor we talked to who was willing to do the conversion. Also, we were looking for a family of computers to fit into a variety of large and

See **ARASERVE** page 36

IBM introduces robotics systems

By Rosemary Hamilton

BOCA RATON, Fla. — IBM last week announced two light assembly robotics systems that use a new model of its industrial computer line as the system controller.

The robots, scheduled for shipment in the third quarter of this year, also use a new version of the IBM-developed Advanced Manufacturing Language, or AML/2, that allows users to customize their robotics applications.

The 7575 and 7576 Manufacturing Systems come with the Industrial Computer Model 310.

Based on the Intel Corp. 80286 microprocessor, the Model 310 has 512K bytes of memory and an Intel 80287 math coprocessor.

A typically configured 7575 is priced at $36,700 and comes with the Industrial Computer; a 7572 Servo Power Module, which is the interface between the robot and the computer; a 7575 Manipulator, which is the robot's arm; and the AML/2 Manufacturing Control System licensed software.

The 7576 Manufacturing System can perform assembly of heavier objects than the 7575 — handling objects up to 22 pounds at a time, whereas the 7575 can handle up to 11 pounds — and comes with the same basic components but sells for $2,000 more.

INSIDE

Context introduces electronic publishing workstations based on Apollo Computer's Series 3000 Personal Workstation/**36**

Pyramid Technology upgrades its operating system and its I/O subsystem/**37**

NEW THIS WEEK

- Pertec offers three Pick-based systems
- For more on this and other new products, see pp. 91-117.

INSTANT ANALYSIS

"I am sure we could find a problem that big. But the question is, What kind of problem can it solve easily that would make it worthwhile? You do not want to be playing games with something like this."

— Charles F. Bender, director of University of Georgia Advanced Computational Methods Center, on the Floating Point Systems 16,384-processor system

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Publishing systems debut from Context

BEAVERTON, Ore. — Context Corp., a subsidiary of Mentor Graphics Corp., introduced late last month a line of color electronic publishing workstations that are based on Apollo Computer, Inc.'s Series 3000 Personal Workstation.

The Context Series of Documentation Workstations, which sell for $25,900, is made up of three models: the Context Writer, which includes Context's documentation editor, electronic mail and text interface utilities; the Context Editor, which has the same features as Context Writer but also includes the Context Picture Editor and graphics interface utilities; and the Context Docu-

”

An IBM Personal Computer AT-compatible coprocessor board will be offered this year.

mentor, which, as the next step up from Context Editor, allows OEMs or users to integrate their data bases with the Context software.

As is the case with the Apollo Series 3000, an IBM Personal Computer AT-compatible coprocessor board will be offered this year as an option for the Context series.

Paul Needham, director of marketing, said he did not have pricing information for the coprocessor board at this time. Once available, it will allow users to run IBM Personal Computer software on the workstation.

Context was founded this January as a Mentor Graphics spin-off with the purpose of pursuing the electronic publishing segment of the workstation market.

With the Context series, the company will be competing with companies such as Interleaf, Inc. and Caddex Corp.

Needham said the systems will be offered with a $2,000 discount until June.

PUBLIC NOTICE CHESHIRE/XEROX END USERS

Anyone experiencing software or systems defects in their 744-II, 744-III, or 745 computers, call Charles Coleman, Vice President, Marathon Mail Management, Inc., 617-999-9839 collect.

Araserve adds applications

From page 33

small locations, with one set of software programs to run on them."

In addition, Araserve had been looking for a system that eventually could interface with cash registers and time clocks. "Honeywell had a better solution for this than anyone else," Muthuswamy said.

The transition to the Honeywell system went smoothly, with tests at a few locations singling out bugs and glitches before the system was implemented on a larger scale.

No additional MIS or DP staff was hired, Muthuswamy said, because "the new system was much more user-friendly than the time-sharing system."

The remote DPS systems interface with the 4381 through a front-end DPS 6 processor, with the standard communications protocol being 2780/3780 for batch processing.

The remote systems normally communicate with the host for eight to 10 hours daily, Muthuswamy said, with little need to go beyond that time frame. He reported no problems in remote DPS 6 communications with the 4381.

Araserve MIS developed its own applications software, including a food production system for all accounts and a nutrition management program for hospitals.

With the DPS 6 system, Araserve has developed additional programs for accounts payable and receivable, time and attendance as well as order entry.

Those applications will be integrated within the next two years, according to Martin.

Pyramid Technology unveils Dualport OSX upgrade

Also offers faster I/O subsystem

By Eddy Goldberg

MOUNTAIN VIEW, Calif. — Pyramid Technology Corp. has announced what it calls a major upgrade of its Dualport OSX operating system. Release 3 includes an improved version of Pyramid's Unix implementation, which is compatible with AT&T's System V Release 2.2.

The company also announced a faster I/O hardware subsystem.

Dualport OSX Release 3 includes bug fixes and new features and improvements to existing kernel, library and utility capabilities.

Pyramid also improved Dualport OSX's implementation of the University of California at Berkeley 4.2 Unix, including features scheduled for Unix 4.3, Pyramid said.

Pyramid said Release 3 includes a Remote Procedure Call facility and supports Sun Microsystems, Inc.'s Network File System.

The I/O hardware subsystem, called the Intelligent I/O Subsystem, consists of two board-level products: the Model 4061 Intelligent I/O Processor (IOP) and the Model 4062 Tape/Printer/Ethernet (TPE) controller.

The Intelligent IOP, priced at $13,850, supports aggregate data rates of 11M byte/sec. to a Pyramid Xtend bus. Pyramid said the subsystem increases performance by a factor of 1.5 to 2 times that of Pyramid's Multibus I/O controllers.

The TPE controller combines tape, printer and Ethernet controllers on a single board for $8,750 and can transfer data among all three simultaneously.

Four Storage Module Device disk drives and two TPE controllers can be attached to an IOP.

Nothing More Than a Dumb Waiter.

Clayton Bailey sculpture courtesy of Joseph Chowning Gallery.

To say the very least, what started as nothing more than a futuristic novelty act, tomorrow's conversation piece, is now a given, an important, productive piece of standard operating equipment for factory automation.

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PACTEL

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Wang enters marketplace

From page 33

systems, it set up a display where its VS 6 was matched against a Microvax II, with each system running a mix of office and Cobol DP jobs.

Since it was Wang's demonstration, it was not surprising that the VS 6 with much less memory than the Microvax ran the jobs more than four times as fast.

What was refreshing

> ***"What was refreshing was that Wang demonstrated its machine in a multiuser environment with a realistic application mix."***

about Wang's approach, however, was that it demonstrated its machine in a multiuser environment with what the company said was a realistic application mix.

Wang avoided vague claims about million instructions per second (MIPS) ratings in favor of a demonstration of system performance. It is Wang's position that what it loses to the Microvax in pure CPU speed it makes up for in areas such as I/O management and terminal intelligence.

So, it was a good effort by Wang. It found a way around MIPS and clock speeds and showed its products in the best possible light.

Now, if only there were a publicly available commercial job mix that managers could use to run on a variety of systems, all configured the same way, and could judge competing systems by the same yardstick.

The mix that Wang would go for, DEC probably would not, and what DEC would go for, DG probably would not. They all seem happy to continue agreeing to disagree.

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SOFTWARE & SERVICES

SOFTALK
Charles Babcock

Ups and downs of downsizing

A new class of software is emerging on the heels of the rapid advances in microcomputer hardware. Its authors are attempting to take the mainframe development environment and make it available on standalone personal computers.

In the process, they are opening a new door to mainframe-to-micro application sharing and distributed processing.

The advantages of doing so are obvious. The developer obtains uninterrupted access to the processor when he works on a desktop, and the cost per million instructions per second drops significantly.

Shifting development work from the mainframe to a personal computer represents a long-term saving for DP organizations and is one example of what William Zachmann at International Data Corp. has termed "downsizing."

The difficulties of downsizing are less obvious. Because the operating systems are different, software that claims to duplicate a mainframe environment on a micro is going to be incompatible with the mainframe version unless it goes through a recompile or syntax conversion.

One package, PC/Focus from Information Builders, Inc. in New York, has many of the attributes of a product that fully invokes the mainframe environment on a micro. The PC version of the language and data base has been made compatible with the mainframe software, and applications can be ex-

See **UPS** page 44

Babcock is Computerworld*'s senior editor, software & services.*

Free Link giveaway baits micro-to-mainframe hook

By Charles Babcock

On-Line Software International in Fort Lee, N.J., has launched a number of systems utilities that have fared well in the marketplace. Its first product, Intertest, a CICS debugging tool, was introduced in 1978 and is now installed at 1,700 sites.

At the start of the Info '85 show in New York, On-Line Software representatives announced they were going to try to create another best-seller by giving away for a limited time a scaled-down version of their micro-to-mainframe link. Dubbed Free Link, it duplicates much of what its predecessor, Omnilink, does, including format conversion to popular micro applications. Unlike Omnilink, however, it cannot upload to anything except virtual disk files.

Jack Berdy, the founder of On-Line Software International, is chairman and president of the $35 million-a-year company. He started it 16 years ago as a consultant working out of his Queens, N.Y., dining room. He recently discussed the issues of micro-to-mainframe links.

INTERVIEW

On-Line's Berdy

CW: When you announced Free Link in October, you said the micro-to-mainframe market was ready to explode and you were going to apply the match. Did Free Link ignite the market?

BERDY: I think we set off a little ignition in the market. We have set out about 350 Free Links. The number isn't overwhelming compared with the number of mainframes, but if you take a look, according to the Gartner Group report, at Tempus-Link [from Tempus, Inc.], which has been out there for years in many different

See **FREE** page 40

ICP picks '85 software hits

By Jeffry Beeler

PALM SPRINGS, Calif. — A pessimist could probably be forgiven for suspecting that last year's sharp industry downturn would be reflected in the latest tally of meritorious sales awards from International Computer Programs, Inc. (ICP). But such suspicion would be sadly off the mark.

Despite the industry's recent rash of sluggish sales volumes and depressed earnings reports, ICP last week publicly commended almost exactly the same number of software products as it did a year ago.

At its April 9-11 executive confer-

See **ICP** page 44

Financial firms examine AI arrival in business world

By Eddy Goldberg

NEW YORK — More than 200 people turned out at a conference earlier this month to hear about applications of artificial intelligence and expert systems in the financial community. Most attendees came away with the impression that although there is great promise for the technology in the business world, it is, at best, only beginning to arrive.

"AI ideas are beginning to appear without fanfare in exciting new products," said keynote speaker Patrick Winston, director of the MIT Artificial Intelligence Laborato-

See **AI** page 40

NEW THIS WEEK

- Control Data ports Power Technologies' Power System Simulator to Cyber 180 systems

For more on this and other new products, see pp. 91-117.

INSTANT ANALYSIS

"IBM has never been more open to try to change things, to develop working relationships."

— Robert Berland, IBM director of strategic planning, Information Services, on IBM's interest in forming relationships with independent software companies

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Oracle unveils productivity tools for SQL/RT on the IBM RT PC

Oracle Corporation has announced six software products for the newly-announced IBM RT PC system. The packages run with IBM's SQL/RT relational DBMS, which was developed by Oracle for IBM. Oracle also announced immediate availability of its full ORACLE product line on the RT PC/AT co-processor.

According to Oracle Director of Product Marketing, Ken Cohen, "The SQL/RT product which IBM is marketing on the RT PC provides a robust relational DBMS. Since Oracle was the source of SQL/RT, we feel well-suited to offer our other products directly. They provide even greater flexibility and decision-support capabilities to RT PC users."

☐**Pro*Fortran**: The Pro*Fortran precompiler allows RT PC programmers to embed SQL database language statements in the middle of their Fortran programs. It is intended for Fortran programs which must access or manipulate SQL/RT database information.

☐**Pro*SQL**: Pro*SQL is a general-purpose call-interface to SQL/RT. Using a simple set of programming calls from a variety of languages supported on the RT PC, the programmer can access SQL/RT.

☐**SQL*IAF**: The SQL*IAF (Interactive Application Facility) package is a complete application generator and run-time system for forms-based applications. It is a complement and extension to the Easy SQL/RT component of IBM's SQL/RT.

The SQL*IAF screen painter lets users design forms using *what-you-see-is-what-you-get* techniques. Multi-table query/update forms can be easily produced for demanding applications. Also, SQL*IAF lets users apply data editing and validation criteria to data entered into forms. Finally, SQL*IAF provides extensive support for non-IBM terminal types, such as DEC's VT-220.

☐**SQL*RPT**: SQL*RPT is a report writer and formatter for use with SQL/RT. Using simple commands, users can create reports of almost unlimited sophistication from their databases.

The database information can also be included in documents formatted with SQL*RPT, allowing text and database processing to be combined in one easy-to-use interface suitable for developers and end-users alike.

☐**SQL*Calc**: SQL*Calc is a Lotus 1-2-3 compatible spreadsheet integrated with the SQL/RT DBMS. Users can place SQL statements into the cells of their spreadsheets, retrieving and updating SQL/RT data automatically. Large SQL/RT databases can be shared among spreadsheet users, with all of the database instantly available to them.

☐**SQL*Link**: SQL*Link provides a micro-mainframe link which allows intelligent transfer of database information between SQL/RT on the RT PC and the ORACLE relational DBMS running on IBM PCs and a variety of mainframes and minis.

SQL*Link lets users exchange information between PCs with ORACLE and the RT PC, with the RT PC serving as a Host.

The package also lets users of SQL/RT exchange database information with a mini or mainframe running ORACLE.

☐**PC/DOS Support**: The ORACLE relational DBMS, 4GL and DSS tools are also available to run on the IBM RT PC/AT co-processor option.

Oracle produces and markets the ORACLE relational DBMS, 4GL and DSS software. ORACLE runs on a wide range of computers, including IBM mainframes, DEC, DG, HP, Stratus and most other minicomputers, and a wide variety of micros, including the IBM PC family.

Oracle distributes its products through a worldwide network of 30 direct sales offices, through the Authorized Oracle Dealer network, and through VARs which participate in the Oracle Alliance program. With its direct and OEM marketing efforts, ORACLE is used by 39 of the top 50 multi-national corporations and at thousands of sites overall.

For further information, contact Oracle Corp., Dept. CWST3, 20 Davis Drive, Belmont, CA 94002, 1-800-345-DBMS.

Free Link baits software hook

From page 39

flavors, they only have 1,800. So 350 in a three-month period, I think, is very successful.

CW: Free Link gets its name from the fact you are giving away the mainframe piece of link?
BERDY: Yes. Customers buy the micro side for $495 and get the mainframe side for free. The package itself will be priced at $10,000 when we remove the offer May 31.

CW: Why are you in the position of giving away mainframe software?
BERDY: It was to get people to make a decision. People are sitting around, evaluating links. They feel it's a major commitment. Yet the end user has a lot of things he wants to get done. What we've done is given him the ability to act now and do the things he wants. We took the heavy part of the decision — the capital expenditure — out of the picture.

CW: Considering the hundreds of micros in companies, don't we have a long way to go to get this market ignited?
BERDY: We have a long way to go to get companies to set a standard solution to the micro-to-mainframe problem. I don't feel we have a long way to go to get independent applications groups doing something. While a company may have 1,500 micros, they're usually clustered by groups that have specific desires and goals.

CW: When you say 350 mainframe pieces were given away, how many micro pieces were sold with them?
BERDY: Most took just one micro piece for the purposes of experimenting and getting their feet wet. We have had a number of those people come back and buy more. One bought 45; others are buying three to five at a time.

CW: Any idea what percentage of companies have come back?
BERDY: No, it's too early to tell. You're talking about an offer that's been available for three months.

CW: Judging by that three-month response, people are still being cautious about committing to a lot of links.
BERDY: Truly. The caution that people have exercised still exists, although I think this is helping to move the industry forward because they are getting the opportunity to play with this and experiment.

CW: Do you think corporations with many micros are going to try a different route? Perhaps they want to collect their personal computers in nodes or local-area networks and link them through a gateway to the mainframe.
BERDY: I think there will be a lot of networks that are established that way, but I don't see them as mutually exclusive functions. The concept of a micro-to-mainframe link is the execution of distributed data processing. You're pulling information from a mainframe down to a micro. Whether that micro is on a node that in turn will allow acceptance of that data by other micros is not an issue to me. The need for a transfer will exist whether it's down line to one micro or a group.

CW: Wouldn't it be less expensive to effect that transfer if you had one gateway to a group rather than buying a link for each micro?
BERDY: On the surface, it looks like it would be less expensive because you tend to think, "I'd only need one piece of transfer software per group." But the two realities are, one, at On-line Software International, that is not a major focal point because we're a mainframe software company and we're really interested in the mainframe side of this operation, and, two, in the micro package, we provide a number of other tools that allow the user to put this information into a format or interchange between formats the way he wants.

So he would still wind up buying that individual micro-based software if he wanted the flexibility. If you just wanted standard data in one format all the time, then it might be answered by clustering.

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AI arrives for business world

From page 39

ry. He said "absorption" will be AI's means of entry into the world of mainstream business applications.

The conference, sponsored by Boston's Suffolk University School of Management, attracted major financial services companies looking to kick the tires of products offered by 14 vendors of AI and expert systems hardware and software.

As promising a solution as they has been made to appear, AI and expert system applications are not, in themselves, that important to potential business buyers, according to Winston.

"Many people becoming interested in AI are buying expert system shells and are looking at them all through feature comparisons," he said. "However, it will all come down to a specific issue, 'Does it do what I need for my application? Does it implement a system that solves my problem?' "

Cost continues to be a prohibitive factor in the growth of AI applications. Winston said that the cost of AI machines has dropped from the million-dollar range in 1980 to the $5,000 to $100,000 range today but that there is still a long way to go before users view hardware as pencils.

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Ups and downs of downsizing

From page 39

changed over the built-in link. But Focus is primarily an information center system, and programmers working on large production systems are unlikely to use it.

Applied Data Research, Inc. (ADR) in Princeton, N.J., has told its Cadre users group that it will have a PC version of Ideal out before September. While language functions will be the same, the initial micro version will not be so compatible with the mainframe version that the two will be able to exchange applications, ADR spokesmen say.

A recent product, the Application Builder from Online/Database, Inc. of Pearl River, N.Y., is micro software that mimics ADS/Online, the Cullinet Software, Inc., development language, and allows a mainframe programmer to transfer IDMS applications between the mainframe and micro. (The user, however, provides the communications; this product has no built-in link.)

A similar product is on the way in June from DBMS, Inc. in Naperville, Ill. Called the Developer Workstation, it creates an IDMS-like data base on the PC and allows a programmer to work in the equivalent of IBM's VS Cobol, according to Chet Sargeant, director of marketing. Its data base management system will be a close enough match to IDMS that no syntax conversion will be needed. An ADS/On-Line version is set to follow.

All of these products are being sold as capable of off-loading mainframe tasks to the micro, but they raise additional possibilities.

"They give me the capability of taking programmers who are mainframe oriented and using them to develop PC programs," notes Robert S. Perlmutter, assistant manager of technical services at ITT Corp. in New York, who has looked at both the Application Builder and the Develop-er Workstation.

The possibility of distributed processing

Colin Moore of Sysmith, Inc., a microcomputer consulting firm in Marina Del Rey, Calif., works with Application Builder for a corporation on the West Coast. "It works both ways. . . . It opens up the possibility of true distributed processing," Moore says.

If micro users can download data from the corporate data base and plug it into their internally developed PC application, they have access to information that was more difficult to retrieve before. If they can send their application to a mainframe to run against the corporate data base, they can obtain information not available within the limitations of PC memory. If the data base they maintain at their PC is out of date but compatible with the mainframe version, they can call for an update.

To date, the explosive growth in PCs has been largely a hardware phenomenon. The second phase of growth will be a software phenomenon and is already under way. This emerging class of software, which ties the micro to the mainframe environment, will extend the capabilities of the PC and tie it closer to the data processing department.

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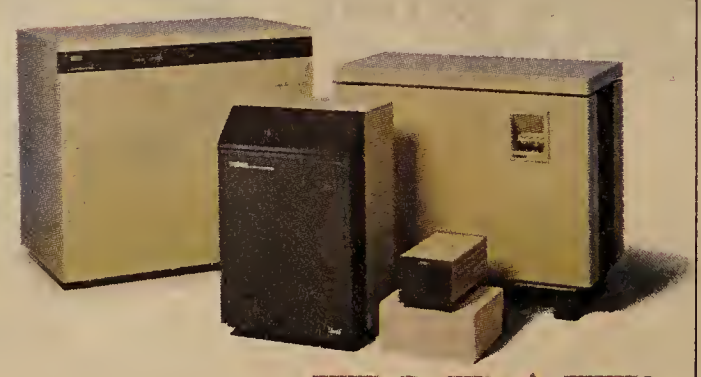

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ICP picks '85 software hits

From page 39

ence, the Indianapolis-based publisher of software-related information presented awards for 249 programs that have topped at least $1 million in gross sales since their introductions. As a group, the products have amassed cumulative gross sales of $2.5 billion, according to ICP marketing associate Gary Voreis.

This year's award total falls just four short of the count in 1985 when 253 software offerings, with combined lifetime sales of $2.49 billion, qualified for kudos, Voreis said.

To ICP, the unexpectedly large number of 1986 sales awards speaks well for the software field's resistance to financial adversity. "While it would be incorrect to conclude that the software industry was totally untouched by last year's doldrums, it is noteworthy that the industry by and large continues to prosper," ICP said.

Last week's executive conference in this Southern California resort marked the 15th anniversary of ICP's Million Dollar Awards, which are divided into 11 categories.

Since its inception in the early 1970s, the ICP Million Dollar Award has been presented some 2,500 times to more than 700 vendors.

Last week ICP honored 14 software products that surpassed $50 million in cumulative sales last year and another six offerings that cracked the $100 million barrier. During the event, the organization also presented Million Dollar Awards to 118 products, more than 30 of which earned the distinction in their first year of availability.

Of the 14 offerings that won $50 million awards this year, seven were application development aids. Another software product category that was disproportionately represented was data base management systems, Voreis said.

Among specific product models, Modular Information Systems, Inc.'s Miser package ranked as perhaps 1985's best financial performer with more than $10 million in sales in its first year, according to Voreis. Second place in the ICP awards sweepstakes was captured by Micro Data Base Systems, Inc.'s Guru, which grossed $5 million in first-year sales, he added.

MICROCOMPUTERS

SMALL TALK
Eric Bender

IBM avalanche sculpts the land

Trying to grasp the full breadth of IBM offerings can be a mind-numbing experience, like gazing out over a glacier. You can be awed by the sheer immensity of the beast or speculate on how the landscape is being carved out underneath all that ice, but it just doesn't seem to be moving fast enough to let you know what's happening, does it?

But several times a year, IBM releases dozens of additional products, and sometimes those show quicker progress than expected.

IBM product avalanches typically uncover one or two potential gems — most recently, the PC Convertible — and incremental advances for just about everything else. But some of these eventually produce big changes in computing environments and should scare IBM's competitors.

As did the original Personal Computer AT, the Convertible shows that IBM isn't afraid to push with technological advances ahead of its major competitors in the Microsoft Corp. MS-DOS world.

To no one's surprise, IBM introduced 3½-in.-drive systems ahead of Compaq Computer Corp. Compaq has perfectly good marketing reasons for waiting. Most customers simply don't want to grapple with another disk format. But in the long run, that drawback will be overpowered by the microfloppy's technical advantages, and after a decent interval, Compaq will respond.

The PC Convertible is a good-looking

See **IBM** page 46

Bender is Computerworld's *senior editor, microcomputers.*

Microsoft targets corporate users with updated Word

By Eric Bender

REDMOND, Wash. — The latest release of Microsoft Corp.'s best-selling word processing software for the IBM Personal Computer, announced last week along with a corporate licensing plan, features a number of enhancements targeted at corporate users. Word Release 3 now includes an outline processor, IBM Document Content Architecture format conversion, quicker operation and a lack of copy protection.

The $450 package was unveiled during Microsoft's first road show for corporate users, who were told "corporate America is ready for the 1-2-3 phenomenon to occur in word processing."

Charles Stevens, group product manager for applications marketing, maintained that Word could emulate Lotus Development Corp.'s star product by establishing a single word processing standard across corporations. Currently, while MIS users are pushing for standards, four or five word processing packages typically are still in use at most corporations, he said.

Leading the list of more than 50 enhancements over Word Release 2 is a fully integrated outline processor, the first to be offered in a dedicated word processing package, Stevens said.

The outline processor works much like Living Videotex, Inc.'s Ready package, simplifying organization and document creation for both first-time users and power users, according to Stevens. The feature has been tailored with Word's style sheets so that once a style sheet is established, proper formats can be automatically generated throughout a document.

Other enhancements include support for more than 70 printers, the ability to download multiple fonts to laser printers, column manipulation, mathematical and sorting functions, automatic generation of indexes and tables of contents, and improved support for the IBM Enhanced Graphics Adapter and other high-resolution graphics cards. Execution speeds also have been boosted, with most frequent operations improved by 30% or more, Stevens said.

Word's "what-you-see-is-what-you-get"

See **MICROSOFT** page 46

AT gets expanded memory board

Multifunction add-on also offers parallel, serial ports

By Douglas Barney

BILLERICA, Mass. — Ideassociates, Inc. last month introduced Idea Supermax/EMS, a multifunction board for the IBM Personal Computer AT that offers conventional, expanded and extended memory; one parallel port; two serial ports; and a memory capacity of up to 4M bytes of random-access memory (RAM).

According to the firm, no other boards for the PC AT currently offer expanded memory and multifunctions. "MIS managers in corporations can standardize on this card for all the ATs being used in the company. It really has everything on it that an AT user would need," said Nora Feldman Gildea, director of marketing for Ideassociates.

Available now, Supermax/EMS can be purchased in several configurations, including a bare board for $495 that contains two serial ports and one parallel port, but no memory, and a fully configured board with 4M bytes of RAM for $2,595.

The expanded memory feature of Supermax/EMS is compatible with software applications written to take advantage of the Lotus/Intel/Microsoft Expanded Memory Specification, which uses bank switch-

See **AT** page 46

INSIDE

Firms are advised to employ the same buying standards for micro packages as for mainframe software/**47**

Personal Computer AT now works with a gas plasma monitor/**47**

NEW THIS WEEK

- General Computer offers Hyperdrive upgrades for Apple Macintosh computers
- For more on this and other new products, see pp. 91-117.

INSTANT ANALYSIS

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IBM sculpts the land

From page 45

little machine at a reasonable price, although its expansion options are limited and expensive ($195 for serial and parallel ports?). With new disk drives, screen and keyboard, it doesn't come close to running off-the-shelf PC software, but the IBM logo is drawing a wealth of slightly vague endorsements from applications vendors.

Naturally, the big question is whether or not the world cries out for a laptop or combined desktop/laptop system. Many vendors have tried to meet that perceived need, and few of them are still with us.

Those 40-plus other announcements in this month's avalanche also featured less dramatic but significant events. One was support for 10.5M bytes of internal memory on the Personal Computer AT. A major push to bring 3270 Personal Computer-style host connections down to standard PCs, giving them better access to IBM's Distributed Office Support System and Professional Office System, also surfaced.

And there were the usual head scratchers, in which IBM seems to be moving majestically sideways. These were exemplified by Topview's new memory expansion option, which is not compatible with the new bank switching option for the 3270-PC, or the Lotus/Intel/Microsoft Expanded Memory Specification.

An operating system extension designed to run multiple applications concurrently, Topview now does program swapping, allowing it to run multiple applications, not particularly quickly, in single tasking fashion. So this is an extension to an extension that works by crippling one of the extension's main benefits.

The real message seems to remain fairly straightforward: Wait for the next-generation PC-DOS. But Topview's role apparently is expanding, as it now plays with the new PC 3270 offerings (not the new 3270-PC offerings — still with me?) and IBM's two local-area networks. In fact, IBM net users can receive electronic mail for the first time, but only with Topview running.

As much as the bull's-eye introductions, this kind of offbeat step keeps customers and competitors waiting on the giant's next moves.

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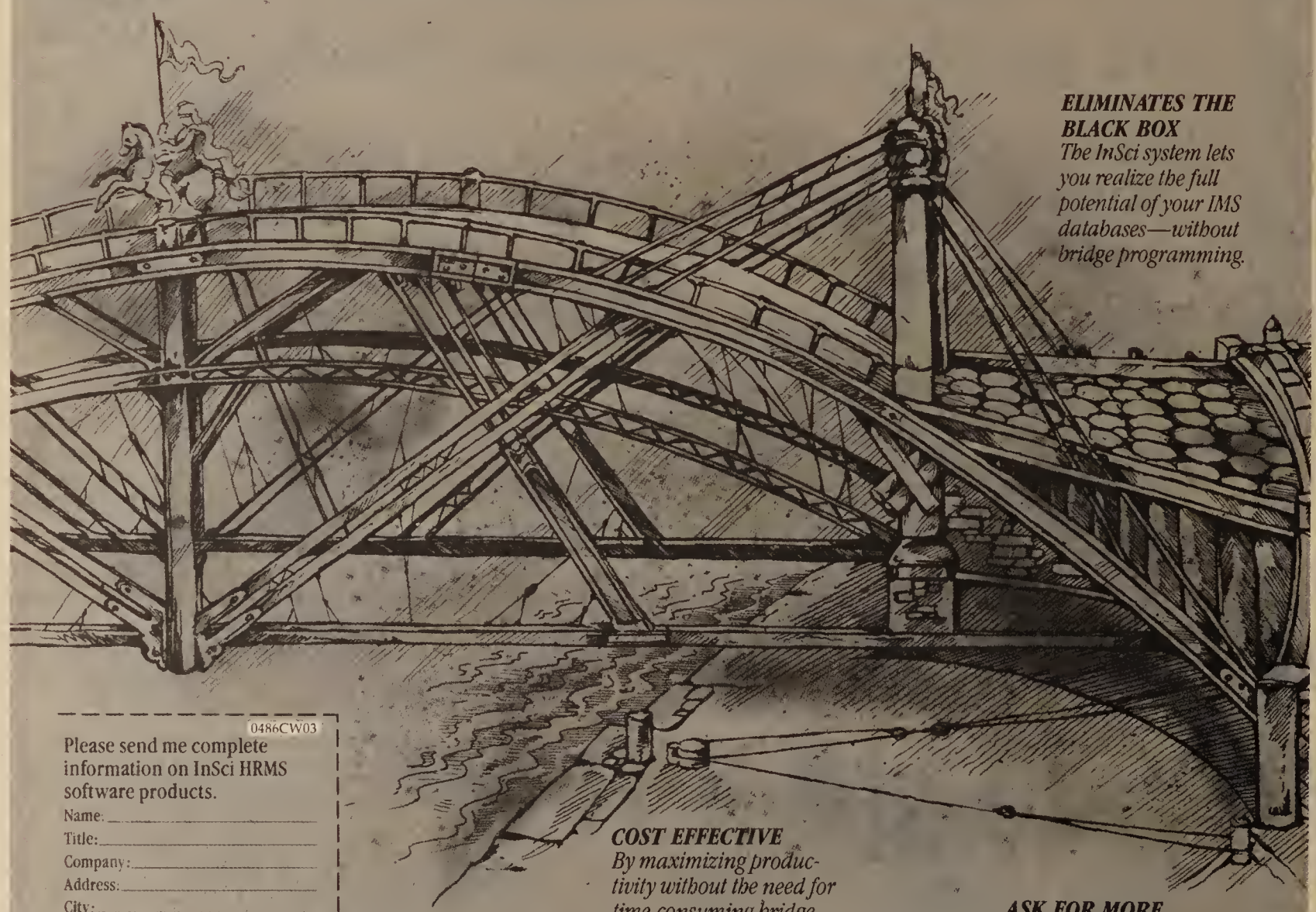

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Microsoft updates Word

From page 45

approach represents one step toward letting users format their documents in various ways, Stevens noted. "The big question is, Can you do it easily?" he added. Word Release 3's ease-of-use enhancements include on-line tutorials that are accessible within the program, so that users needing assistance "don't just get a Help screen, they get a practice session."

Although Microsoft is emphasizing connectivity plans, Word 3 currently is a single-user system.

Word 3 is compatible with, but not tailored for, Microsoft Windows, and it does not support the importation of graphics, Stevens said.

The new software's price tag is $55 higher than its predecessor's. Registered users may upgrade for $75. Word 3 requires 256K bytes of internal memory.

AT board offers memory

From page 45

ing technology to allow a personal computer to exceed the 640K-byte RAM limitation of Microsoft Corp.'s MS-DOS. The expanded memory of Supermax/EMS also can be used as a virtual RAM disk.

Applications currently written for EMS include Ashton-Tate's Dbase III Plus, Micropro International Corp.'s Wordstar, Lotus Development Corp.'s 1-2-3 and IBM's Displaywrite.

The conventional memory of Supermax can support applications that are not written for expanded memory.

Supermax/EMS also contains print spooling software that uses expanded memory to print large files while the PC AT is used for other applications.

Evaluate software vendor before purchase, buyer urges

By Charles Babcock

NEW YORK — Corporate buyers of microcomputer software should be more assertive in evaluating a vendor and use many of the same standards as buyers of mainframe software, said a former microcomputer software buyer for the Metropolitan Life Insurance Co.

"Every issue that was in the 40-page mainframe contract should be reviewed with a micro software purchase," Candice Pamerleau recently told a joint meeting of the Association for Systems Management, New York chapter, and the Microcomputer Managers Association.

Speaking at Sardi's restaurant, Pamerleau said that corporate software buyers must be wary of unsubstantiated claims. "Some advertising is future planning, statement of direction or wishful thinking. Sometimes the vendor is saying, 'If I get caught, maybe I can add it.' "

Pamerleau formerly supervised the software purchasing for 1,500 microcomputers at Metropolitan Life, where she was the microcomputer project manager in the information center. She now helps market Metropolitan Life's office systems.

Corporate buyers are too reluctant to use their purchasing power in evaluating a potential purchase, she said. A company will have a large stake in a software vendor once it buys its product. Before buying, the purchaser should ask about the vendor's finances. "Don't hesitate to ask the officers to come in and make a presentation," she advised.

In evaluating software, she urged that a series of questions be raised:

"Does the vendor call it an upgrade when it is really a fix? Do you pay for 'upgrades'?

"Will the vendor use you as a beta test site? Will you be able to test new features to see how they fit in with your organization?

"With 1,500 micros and 10,000 users, how will you introduce the product to your company? Does the vendor train the trainers?

"If the vendor discovers a bug, how does it let people know? Does the vendor publish a newsletter?

"Has the vendor set up support for you as a corporation? Do you stand in line with everyone else, even though you represent 2,000 users?"

In addition, Pamerleau urged corporate buyers to read "Software Digest" evaluations.

Do not tolerate vendors who waffle in committing themselves on compatibility, she suggested. "In word processing, we dropped a vendor who sent us mixed signals on whether his product would run on the IBM Personal Computer XT," she said.

IBM offers display adapter

Allows 3295 Plasma Monitor to run on AT

By Douglas Barney

IBM last month announced the $1,495 IBM 3295 Display Adapter for the IBM Personal Computer AT. Contained on one full-size expansion card, the device allows a 3295 Plasma Monitor to emulate a monochrome monitor and to store up to eight 80-col. by 25-line Personal Computer screens simultaneously, four of which can be viewed at the same time in full.

Both the adapter and the 3295 Plasma Monitor, which sells for $3,395, are only available through IBM value-added dealers, value-added resellers or direct from IBM. "Not every dealer will have it mainly because it is expensive, and it is kind of a niche product for places where they need a real big information display or an information display in a low-light-intensive area," said IBM spokesman Paul Neuman.

The 3295 Display Adapter requires a 3295 Plasma Monitor and an IBM 5150 Personal Computer, an IBM 5160 Personal Computer XT or a 5170 PC AT.

Display adapters previously were available for the IBM PC and PC XT.

Subscriptions to Corporate Software 'Tech Notes' newsletter available

Corporate Software, Inc. is now offering its "Tech Notes" newsletter on microcomputer software products to the general public for a $250 annual fee, according to the firm.

The Canton, Mass., software distributor described the newsletter as "a monthly collection of technical notes on upcoming product releases, newly discovered program bugs, undocumented error messages and tricks for making products work better." For example, a recent issue described a way to load files more quickly with the latest release of Lotus Development Corp.'s 1-2-3.

Subscriptions may be ordered by contacting Corporate Software headquarters.

The newsletter previously was available only to Corporate Software's highest volume customers, who will continue to receive it for free.

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Executive Report

PHOTO BY P. CHARLES LADOUCEUR/GALLIUM ARSENIDE WAFER COURTESY OF M/A-COM, INC.'S ADVANCED SEMICONDUCTOR OPERATIONS

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An interview with Larry Sumney, president of the Semiconductor Research Corp./56

Fighting a stiff battle with U.S. chip makers, Japanese firms remain on the leading edge of semiconductor research/58

On beyond silicon

A look at new semiconductor technologies

By GLENN RIFKIN

Point: AT&T Bell Laboratories demonstrates a "ballistic transistor," a revolutionary device that reportedly allows an electron to move through a given material at its theoretical maximum speed. A laboratory prototype is being prepared that will run at a reported 10 femtoseconds (a femtosecond is 1 quadrillionth of a second), but Bell Labs is remaining mum on the subject. If it works, however, the implications are enormous: a transistor with switching speeds hundreds of times faster than today's equivalent.

Counterpoint: Dragan Ilic, director of the high-speed devices laboratory at Hewlett-Packard Co., is well aware of the research going on in semiconductor devices. But he, like most of his colleagues in the computer industry, tends toward the pragmatic point of view.

"It's not enough to make individual links in a chain better," he says. "You have to have the whole thing matched and show the advantage at the output point in the system."

Ilic is fascinated by research that uses the human brain as a model, but he warns, "If you think of the memory that is available in a single human brain, it is on the order of all the memory that's manufactured in the world in one year."

In a world that changes as rapidly as that of the computer industry, it is tough to surprise anyone with promises of amazing machines of the future. How can the industry top the mind-boggling advances that have characterized computer technology during the past 30 years. Capabilities requiring devices that once filled a building now fit on the head of a pin. One can hardly digest the latest order of magnitude leap forward when the next-generation prototype is already making headlines.

Silicon, with all its wonders, has limitations, drawbacks that keep the next quantum leap forward at bay.

Making all this possible is the semiconductor, a wondrous device that forms the foundation for the integrated circuits and microprocessors that run so much of the world. In this universe of small, silicon has long been the dominant semiconductor material.

As the second most abundant element — after oxygen — in the planet's crust, it is available and cheap. Its properties for conducting electrons as well as its sensitivity to light inspire continuous improvements and make silicon the current and future king of the semiconductor kingdom.

Continued on page 52

Rifkin is a Computerworld *senior editor.*

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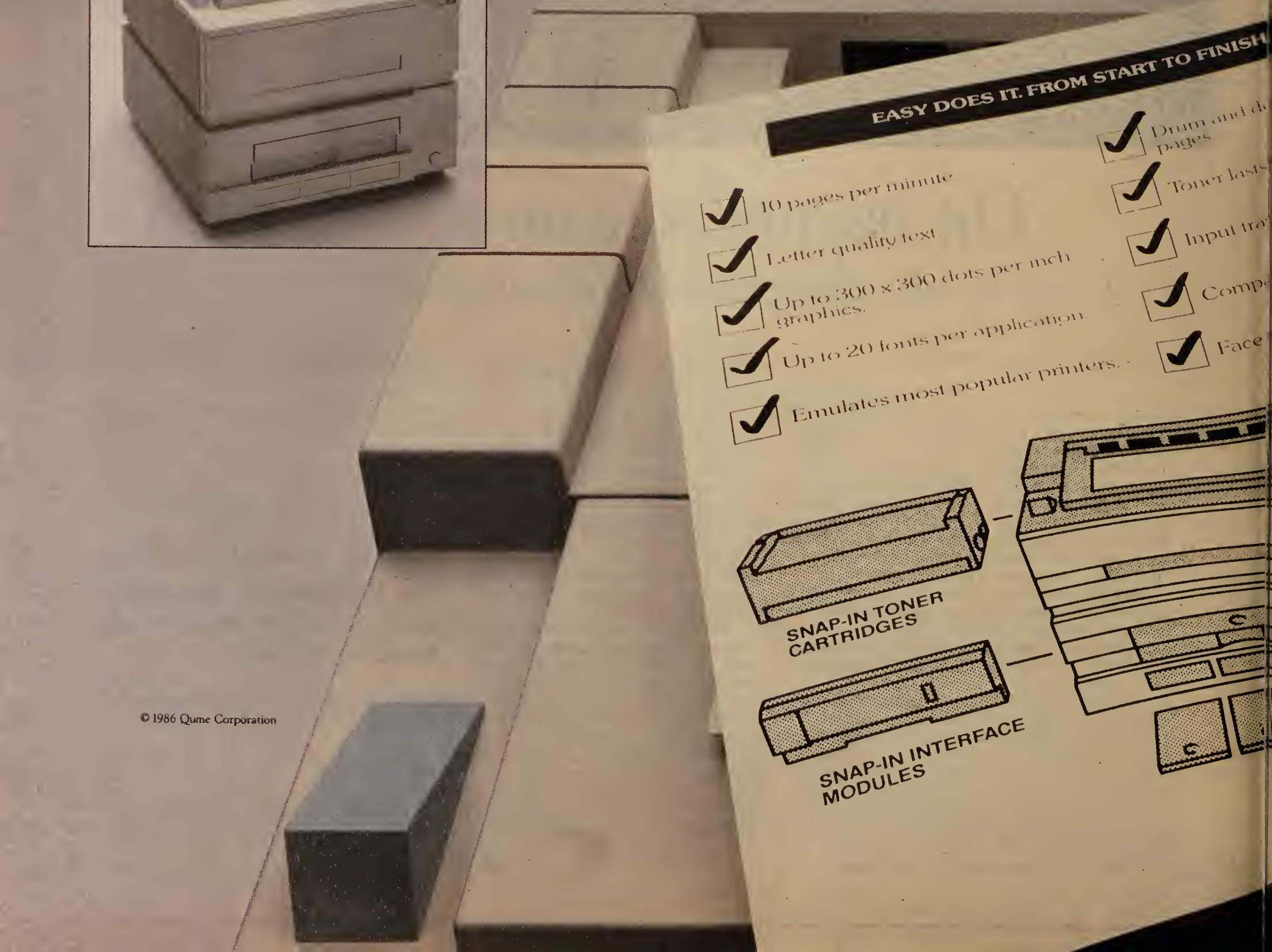

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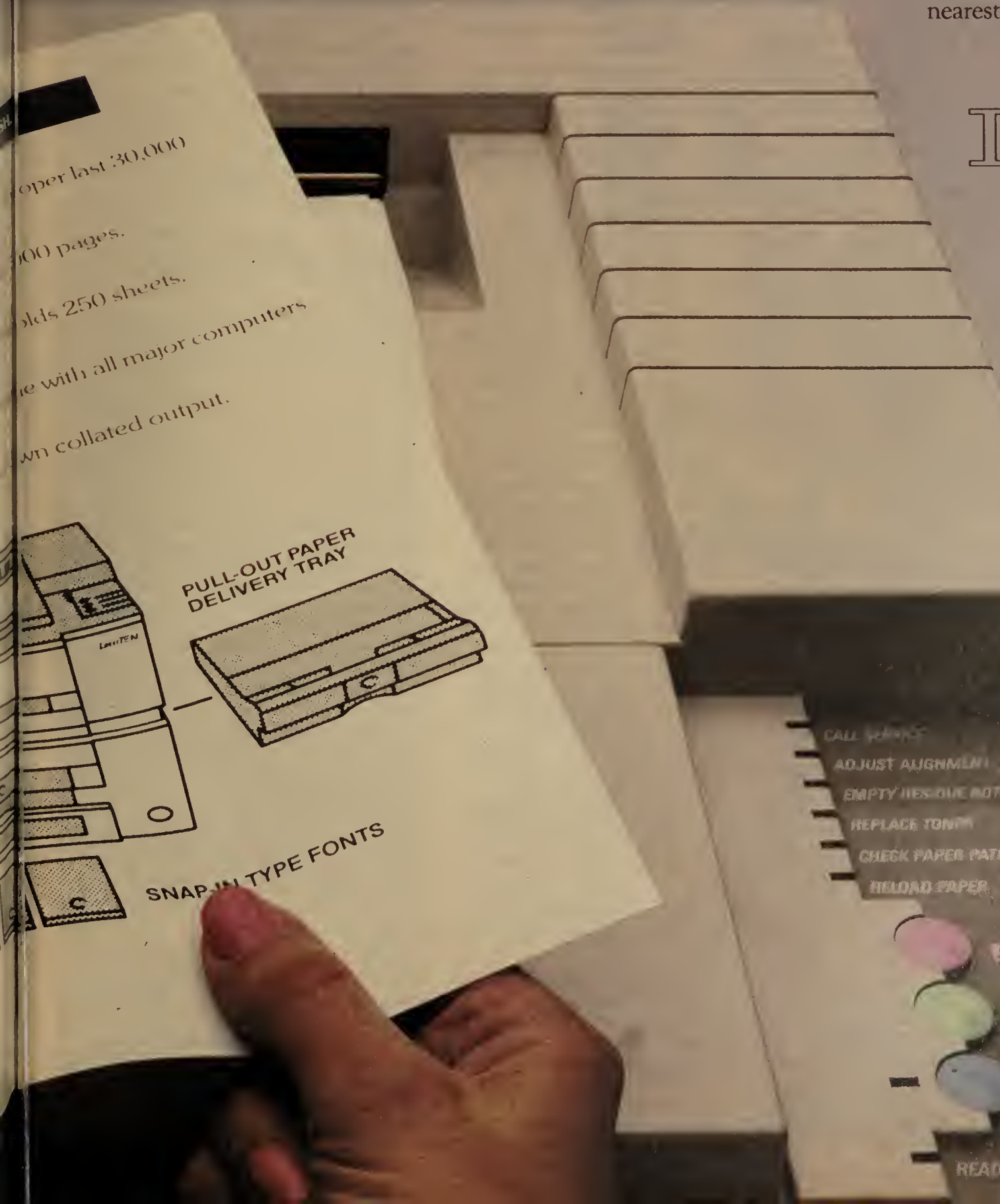


A look at new semiconductor technologies

Continued from page 49

But while silicon captured the imagination of the mass market and formed the basis for standard technologies, small pockets of creative researchers are looking for newer and better ways to compute.

Silicon, with all its wonders, has limitations, drawbacks that keep the next quantum leap forward at bay. To create systems that emulate the human brain and provide true artificial intelligence, researchers believe that silicon may simply not be enough.

Aside from the technological barriers that face silicon-based devices, the semiconductor industry itself has been rocked by plummeting growth rates and sales in recent years, mainly because of overzealous Japanese competition.

Threatened, the main semiconductor players such as Intel Corp., Motorola, Inc., Texas Instruments, Inc. and National Semiconductor Corp. have gone into a survival mode. They concentrate on practical manufacturing concerns rather than horizon-line R&D.

Unlike innovative start-up operations that can sell fast and quickly recoup R&D costs, these giant chip makers must get in and stay in a high-volume business to turn a profit.

"The design and development costs for a 1M-bit dynamic random-access memory chip is on the order of $50 million," says Gerhard Parker, vice-president and director of technology for Intel. "So you've really got to be in the volume business to make money. And worse than that, it costs $200 million to build the factory to manufacture them. You've sunk in $250 million before you really produce the first circuit."

In that competitive environment, the leading-edge research is left to a few innovative start-ups, the resource-laden computer makers like IBM and Digital Equipment Corp., research labs such as Bell Labs and Xerox Corp.'s Palo Alto Research Center (PARC), and schools like MIT, Stanford University, Carnegie-Mellon University, Cornell University and the University of Illinois.

"Increasingly, the development work I do is aimed at manufacturability rather than gee-whiz new designs," Parker says. "I don't subscribe to the theory 'Let's just do the R&D and let the Koreans manufacture it for us' because pretty soon, they'll do the R&D too, and then what will we do?"

While work continues in silicon — mostly finding new ways to pack components onto chips more densely — there are avenues of research opening up using exotic new materials and revolutionary designs.

Already making its presence felt is gallium arsenide, a versatile material that is faster (electrons can be moved four times faster than on silicon) and more powerful (electrons require lower voltages than with silicon). Gallium arsenide promises to be at the core of impressive computer systems on the horizon.

Cray Research, Inc., for example, announced that gallium arsenide will be at the heart of its Cray-3 supercomputer, a machine that will appear in 1987 or 1988 and possibly change the face of supercomputing.

Though gallium arsenide receives the most ink, research is under way at universities and corporate laboratories around the world on other technologies that promise to challenge the very fundamentals of computing. In the 1990s, devices will include CMOS designed in quarter-micron components, newly developed resonant hot tunneling devices as well as three-dimensional chips.

Beyond that, experts speak about optoelectronics — the use of fiber-optic lasers on chips; High-Electron Mobility Transistors (HEMT) — gallium arsenide-based semiconductor devices that use submicron components and have achieved switching times of 5.8 picoseconds; and biochips and neural networks — highly interconnected electronic circuits that use organic materials to mimic human rather than machine processing.

The researchers hedge their bets when speaking about their respective technologies, but the gleam remains in their eyes. No one is willing to write off silicon; indeed, advanced work in bipolar and CMOS devices provides exciting new capabilities in advanced computing.

But as technology advances, the boundaries are redefined. Computers that approximate human processing are on drawing boards, and these new semiconductor technologies are forging the way toward that goal.

One wonders why anyone would be pressed to look beyond silicon-based technology. These extraordinary devices are at the heart of systems that drive everything from television sets to space shuttles. Silicon withstood its most serious challenger, the Josephson Junction, a technology requiring the supercooling of two lead alloys to absolute zero, or minus 450 degrees Fahrenheit.

Josephson Junctions were the talk of the 1970s as they promised switching speeds of 1 picosecond (1 trillionth of a second). IBM, which pursued a major effort in Josephson Junctions until 1983, abandoned that technology when it became clear that up-and-coming devices such as silicon bipolar and CMOS as well as gallium arsenide promised a better return on investment. The Japanese continued their Josephson Junction research, but recent rumors from Japan indicate that they too have thrown in the towel.

"We believe, along with others, that there's a lot of life left in silicon technology," says John Armstrong, research division vice-president of logic and memory at IBM.

IBM pours much of its resources into both submicron CMOS and high-performance bipolar silicon research. CMOS and bipolar integrated circuits form the two major families in current silicon design. Bipolar has long been the leader and is prevalent in large computer systems. CMOS is considered the hot new player in the game, and analysts predict that it will dominate the market by 1990.

Bipolar devices tend to consume more power than CMOS integrated circuits. CMOS' greatest advantage is in its low power dissipation, but it requires more components for a given circuit function and, therefore, takes up more space on a chip. Though CMOS is the new star, bipolar continues to receive attention at places like IBM.

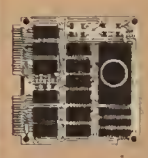
"Bipolar continues to be the fastest and most powerful integrated circuit you can build," Armstrong says. "From the point of view of a systems company [like IBM] that is interested in building the most powerful general-purpose computer we can, we have to use bipolar."

IBM, therefore, bucks the trend by intensifying its efforts in bipolar silicon research. Despite that,

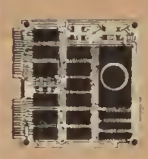
Continued on page 55

ALTERNATIVES TO SILICON: A SAMPLING

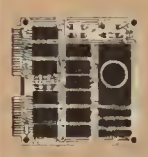
Gallium arsenide. The rising star in semiconductor research. The combination of gallium and arsenide produces a faster, more powerful and more expensive device than silicon.



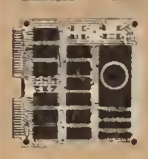
High-Electron Mobility Transistors. A specialized high-speed device that, when cooled to 77 degrees Kelvin, produces extremely high switching times (as fast as 5.8 picoseconds).



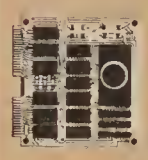
Josephson Junctions. Envisioned in 1962 by Nobel Prize-winning physicist Brian Josephson, these circuits become superconductive when cooled to near absolute zero (minus 400 degrees Fahrenheit).



Biochips. Microchips made of proteins and manufactured by E. Coli bacteria. A futuristic concept that would incorporate neural characteristics into integrated circuits.



Optical chips. Integrated circuits using a combination of silicon, gallium arsenide and fiber optics that would allow information to flow from one chip to another at the speed of light. Research is being done at Xerox Palo Alto Research Center, AT&T Bell Laboratories and several universities.



Ballistic transistors. A chip with electrons moving at theoretical maximum speed, which would potentially switch at 10 femtoseconds (1 femtosecond equals 1 quadrillionth of a second). Prototype work being done at Bell Labs.

CW Chart

MITCHELL J. HAYES

Tracing the roots of the microchip

By T. R. REID

There was a time, a half-century or more ago, when inventors and engineers were the toast of American society. By his 35th birthday, Thomas Edison was the best known man on earth. In the years before World War I, names like Bell, Ford, Wright and Singer sparked the instant recognition that today is reserved for the likes of Cronkite, Madden and Madonna.

In contemporary America, inventors and engineers are generally relegated to obscurity. This is why almost nobody in our media-soaked society can name the two Americans who spawned a multibillion-dollar global industry and launched the microelectronics revolution with a crucial invention: the semiconductor integrated circuit, or in common parlance, the microchip.

It has been a quarter-century since these two latter-day Edisons — Jack S. Kilby, of Texas Instruments, Inc. and Robert N. Noyce, of Intel Corp. — hit on the idea of integrating all the components of an electric circuit on a single flake of silicon. With that ingenious notion, they solved the most important engineering problem of their time and made possible all the digital wonders — clocks, calculators, computers — we take for granted today.

Kilby and Noyce are both products of the American heartland. Noyce is a minister's son from Grinnell, Iowa; Kilby's father ran the local power utility in Great Bend, Kan. Both decided early to pursue a career in electronics. For all that, though, they are strikingly different men.

Noyce, currently vice-chairman of Intel and one of the leading spokesmen for the U.S. semiconductor industry, is a razor-sharp, impulsive extrovert who exudes the intense self-assurance of a jet pilot. He has been successful at just about every endeavor: Shortly after earning his Ph.D. at MIT in 1953, he became one of the earliest engineering immigrants to California's Silicon Valley and went on to found two of its best known firms, Fairchild Semiconductor Corp. and Intel. His net worth today is somewhere in the $100 million range.

Kilby is a quiet, gentle, soft-spoken, grandfatherly type with an unassuming manner. He flunked the entrance exam at MIT and was happy to receive a single job offer after taking his electrical engineering degree at the University of Illinois in 1947. He works today as a free-lance

See REID page 53

Reid is the Denver bureau chief for The Washington Post *and writes a syndicated column called "The Computer Report," which appears in newspapers around the country. He is the author of* The Chip *(Simon & Schuster, Inc., New York, 1984), a history of the microchip and the men who made it.*

REID from page 52
inventor and consultant to TI in Dallas — a position that brings satisfaction, he says, but marginal economic rewards.

These two men were just embarking on their engineering careers when William Shockley's team at AT&T Bell Laboratories stunned the electronics industry with the invention of the transistor.

But the transistor had a serious disadvantage. For most applications, the transistors and other components of a computer's circuitry had to be wired together by hand. The cost — in time, wages and reliability — of hand-building circuits with millions of components was impossibly high. The designers could dream up wonderfully intricate computer circuits, but the factory could not build them.

This simple truth, posing a towering obstacle to the future of computers and other digital devices, was known as "the tyranny of numbers."

By the late 1950s, engineering groups around the world were searching for the solution. Kilby, working alone in his lab at Texas Instruments, found it in July 1958. Six months later, Noyce at Fairchild Semiconductor hit on essentially the same idea.

The monolithic or integrated circuit that Kilby and Noyce independently devised eliminated the tyranny of numbers by eliminating the need for hand-connection of circuit components. Their inventions called for etching all the transistors and other components of a circuit onto a minute chip of silicon, with the connections built right in as part of the manufacturing process.

The first semiconductor chips — simple circuits containing about a dozen components — went on the market in 1961 at prices of about $120 each. In the ensuing 25 years, the complexity and capability of integrated circuits has skyrocketed, while prices have plunged.

In today's market, chips containing a million components or more can be purchased for less than $5. At a time of great official breast-beating about productivity, the semiconductor industry has recorded the greatest productivity gains ever recorded anywhere.

The first semiconductor chips were simple logic circuits designed to replace small sections of the component circuitry in the innards of computers. Over time, engineers found ways to replicate all the different aspects of a digital circuit — I/O, storage registers, logic, timers, computation units — on various types of chips.

Kilby invented the first handheld calculator — with all the electronics squeezed onto a single chip — in the late 1960s. In 1968, Noyce and his colleague Gordon Moore founded Intel with the then-daring idea that they could produce computer memory units on chips.

Intel's first "high-density" memory circuit — a 1,024-bit random-access memory (RAM) chip — was unveiled late in 1968. The definition of high density changed rapidly; this spring, the first 1M-bit RAM chips came on the market, and design work is under way on the 4M-bit memory chip.

Today's megabit memory chip costs about the same price that was charged for a kilobit chip 18 years ago; its access speed is nearly 1,000 times faster than the first memory chips.

In 1971, an Intel engineer named Marcian E. Hoff designed a chip of almost Gothic complexity that combined all the elements of a computer on a single chip of silicon. Intel called the product a "microprocessor."

Later generations of this "computer on a chip" led to the personal computer and a plethora of so-called smart devices, from smart bombs to smart toasters to smart traffic lights.

The history of the chip provides genuine grounds for national pride; virtually every important breakthrough, from the first simple logic chip to the complex modern microprocessor, was the product of American ingenuity.

That makes it even more ironic that so few Americans have ever heard of their ingenious countrymen, Kilby and Noyce, who thought up the integrated circuit in the first place. ■

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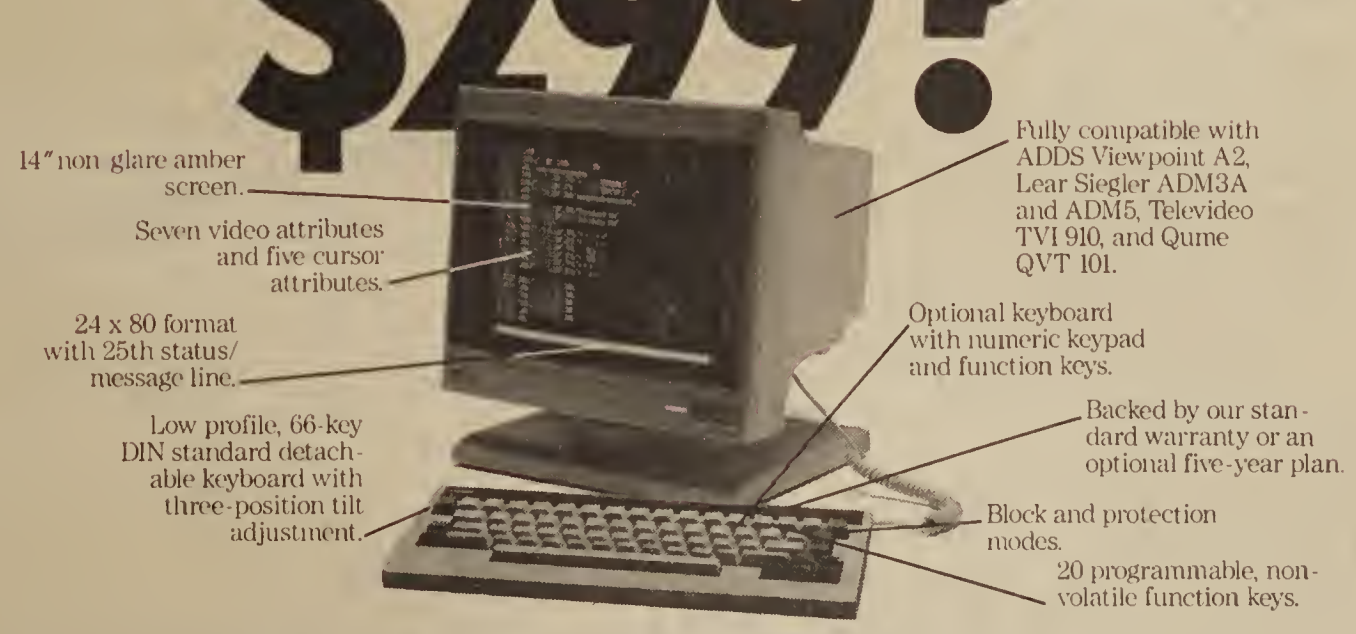

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Executive Report/On Beyond Silicon

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CMOS is rapidly becoming the favored approach by the semiconductor industry for very large-scale integrated (VLSI) chips because of its performance advantage.

In addition, specialized segments of the semiconductor industry, such as application-specific chips, are chewing up larger parts of the market and providing a strong challenge for standard chips. In 1985, a very unprofitable year for the semiconductor industry, makers such as VLSI Technology, Inc. of Santa Clara, Calif., thrived.

Using three methodologies — programmable logic devices, gate arrays and cell-based design — custom or semicustom chips have caught on big. According to Andrew Haines, strategic marketing manager for VLSI Technology, companies such as DEC, Wang Laboratories, Inc., HP and Apollo Computer, Inc. are turning to custom chips.

Manufacturers like VLSI Technology can either design the application-specific chips themselves or allow customers to come to a design center and do it themselves using the firms' design tools.

Though the newness of the technology is still an impedance to widespread acceptance of application-specific chips, Haines is confident that more computer makers are moving up the learning curve. He suggests that the use of gate arrays and other application-specific chip technologies may provide the only quick way for vendors to keep up with the technology push.

"The price/performance advantage of going with application-specific chip technology is so enormous that these companies can't ignore it anymore," he says. "On the high end today, the superminicomputers or even minisupercomputers are primarily done with application-specific chip technology."

Wang, for example, recently placed 300 integrated circuits into a single-cell-based integrated circuit. Intel or Motorola, Haines says, are not going to provide that capability because they are pushing their own products.

Most computer equipment is filled with transistor-transistor logic chips with 50 gates per chip — a technology that is 10 to 15 years old. An application-specific chip allows those to be replaced with up to 10,000 gates per chip.

The semiconductor giants are keeping a sharp eye on the custom chip business as well. "The application-specific chip makers are making money and growing while we're having trouble," Intel's Parker says. "There's a very good market there, and we're trying to get into it."

The availability of high-performance CMOS and the development of superior design technology is creating dramatic changes in the world of silicon-based semiconductors.

Whichever approach is taken, as the density on the silicon chips becomes greater and greater, new levels of performance in ever smaller packages appear. And it moves quickly. Just six years ago, devices were using 4-micron geometries with 64K-byte memories. This capability gave rise to everything from digital watches to personal computers. Today, 2-micron chips are in production providing 256K-byte random-access memory chips and the availability of minicomputer power on a desktop.

According to many researchers, the next stop is at the 1- to 1½-micron level, which is the dividing line between VLSI and ultra large-scale integration (ULSI). ULSI will lead to mainframe power on a chip.

Ron Powell, associate director of the materials and equipment laboratory for Varian Associates' Research Center in Palo Alto, predicts that by 1990, ½-micron geometries will produce 4M-bit memories and a superchip capable of supercomputer power. In 1995, the potential of ¼-micron devices will lead to user-friendly computers with human-like logic and expert systems that truly

Continued on page 57

'On the high end today, the superminicomputers or even minisupercomputers are primarily done with application-specific chip technology.'

— Andrew Haines
VLSI Technology, Inc.

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Interview

SRC head: Manufacturing hinders chip industry

In the fall of 1981, the Semiconductor Industry Association set up an ad hoc committee to address what it saw as a declining competitive posture of the U.S.' integrated circuit industry. From that committee's recommendation was born the Semiconductor Research Corp. (SRC), a nonprofit consortium of 40 U.S. companies, including IBM, Digital Equipment Corp., General Motors Corp., Xerox Corp. and all the major semiconductor companies.

The SRC was designed to accelerate the progress in semiconductor research, broaden university involvement in semiconductor design and manufacturing education and increase the supply of qualified personnel for the industry.

Larry Sumney, SRC president since 1982, spoke with Computerworld *Senior Editor Glenn Rifkin about the future of the semiconductor industry.*

What is the SRC's role in semiconductor research?

The founding committee saw fragmentation of research in the industry, the inability of many companies to sustain research programs of the magnitude that would allow them to put above-threshold funding on areas of critical importance.

So the SRC was set up to establish a generic research program supportive of the needs of the industry.

What kind of research are you doing?

Our research program spans three major areas: microstructures, design sciences and manufacturing sciences.

One of the major tasks we were charged with was to create a base of manufacturing research in the U.S. university system because none really existed before the SRC. We have actively pursued that, and we now have programs at the Microelectronics Center of the University of North Carolina at Chapel Hill, University of Michigan, Stanford, Lehigh, Cornell, Auburn and other universities.

Are you researching only silicon technologies?

No. We have a fairly major effort in gallium arsenide as well, which is probably in excess of $1 million now. Silicon was the first thrust and one in which we've shown the most growth. But many things in manufacturing apply to both silicon and gallium arsenide.

What about other areas of advanced research such as optical chips or biochips?

We're looking at the whole area of optical interconnect using deposited gallium arsenide on silicon to connect the chip to the outside package. That work is being done at Cornell University and other places. We are not looking at biochips or other things further out. The optical interconnect is where that stops.

What kind of advanced research is being done in silicon?

The work divides into three areas with respect to the microstructures and the devices themselves. We have a major program at Cornell that is aimed at developing a ¼-micron CMOS process. The research vehicle there is a 4M-bit static random-access memory. That program has a $1.7 million annual budget.

We have a program at Rensselaer Polytechnic Institute called institute processing, which is a whole new methodology for processing wafers. Instead of moving them from one processing station to another and introducing dirt and transport problems, the idea is to process the wafers serially, let them stand still and operate on them with beams such as X-rays and lasers.

We are also looking at how to design silicon chips of the complexity we see in the future. We have a number of design efforts. One major program at University of California at Berkeley is studying design tools and another at Carnegie-Mellon University is looking at the design process from the system viewpoint.

We are looking at how to design silicon chips of the complexity we see in the future.

— Larry Sumney
Semiconductor Research Corp.

Are the leading obstacles in silicon research in the design or manufacturing process?

It is clearly in the manufacturing process. We show our greatest strength in the area of design and architecture. That's where the U.S. leads. Our program is aimed at maintaining and even making that lead greater. But in the manufacturing area, it's a totally different picture. The Japanese clearly excel in manufacturing and have been very good at taking research output from our country and translating it onto their factory floor. That's where we have fallen behind.

One of the reasons is that manufacturing has never been a discipline worthy of academic pursuit. Universities never contributed to the understanding of the manufacturing process as a science rather than an art. In Japan, it is clearly prestigious to be in the manufacturing area of a semiconductor company. In this country, it's simply not that way. The real prestige comes with being in the research arena.

So there is a problem in manufacturing — not understanding the process, not having people in it with an academic background. The whole aura that surrounds it is not of the level that young people are interested in. We are trying to correct that by setting up a curriculum at schools around the country, starting with the University of Florida. We are setting up a master's degree program in integrated circuit manufacturing. And we'll be working with other schools as well to lead to formal degrees in this area.

What is the program's curriculum?

It is multidisciplinary in nature. It involves courses in operations research, in the business school, because many of these guys go into companies and are in charge of a profit and loss operation, and they need to know the business aspect. And it also involves the technical aspects of operations research.

That's the biggest obstacle. That's where your gains are going to come in terms of reduced cost because your yields will improve when you understand the process.

Do the Japanese have an insurmountable lead?

It's difficult to assess how far away we are. But I don't think we're so far behind that we can't recoup. That's the position we are taking.

But it's still a major problem?

It's *the* major problem.

Is the research in such things as gallium arsenide meaningless if you can't even solve the manufacturing problems for silicon?

It's still valuable because most people knowledgeable in this area feel that gallium arsenide is going to be a niche technology for some time. The idea of it completely replacing silicon with the strong base that silicon has in this century is probably something that will never happen.

So for the remaining 14 years, silicon is going to be the technology of choice and of high-volume production. But there will be those requirements, many in the U.S. Department of Defense, that require very high-speed operation. And gallium arsenide is probably the only technology that is going to fill many of these applications.

Are you satisfied with the current direction of the SRC?

We have passed many critical thresholds. We are starting to see tremendous output from the program. We established credibility and are into a phase of optimizing the way we disseminate information and transfer technology. And we're trying to imprint a longer horizon on the research program.

Because of the cross section of members we have, the concept of what is long-term research is different to different companies. IBM sees long-range research much differently than a small semiconductor research company on the West Coast.

In general, we feel our goal can best be served if the horizon for research is rather far out. So we are continuing to look at major new design concepts rather than just tool-oriented research.

What advice would you give to the U.S. semiconductor industry?

The industry is going to have to think of doing business differently. The whole concept of venture capital and entrepreneurial companies has fragmented the industry. The advantage has been that a lot of innovation has come from that structure. And that's gotten us to where we are today.

But that fragmentation has made many companies here end up being reasonably small, and they can't be expected to compete with these giant, monolithic industrial concerns in Japan.

The only way around this is to extend the concept of cooperation. Cooperating in very basic, generic research is one way.

Is it naive to assume, in a country where individualism is so much a part of the fabric of our society, that that can change in this industry?

We see in the SRC a new degree of willingness to cooperate. So I don't think it's impossible. But I do see that the individualistic nature — the need to achieve, to win on an individual basis — that's something that is going to be difficult to counter. But it will have to be overcome. I don't think it's impossible because we've seen tremendous changes in companies that belong to the SRC. They are talking about things they never talked about doing before.

And these things are becoming more possible in research because of changes in antitrust laws. The legal framework is adjusting itself to enable these things to happen. So the attitudes are changing. Whether they will change fast enough and to the necessary extent are the questions that have to be asked. ■

Continued from page 55

mimic the human expert.

"The melding of logic and memory at the ¼-micron level is really going to give awesome power to our chips," Powell says. "It may be delayed by economic factors in the semiconductor industry, but that is where it's heading."

For the MIS director, the task is to keep abreast of the company's computing needs and follow closely the trends in semiconductor development. According to Parker, MIS must avoid buying too much equipment that is bordering on obsolescence and attempt to bring in new capabilities as they appear. "Those new capabilities are going to come at a fairly steady rate based on the chip rates downstream," he says.

□ □

Gallium arsenide makes its move

It is fashionable today to conjecture about the demise of silicon at the hands of gallium arsenide. While interest in gallium arsenide grows — analysts cite 70% growth rates during the past five years and predict a $13.5 billion industry by 1994 — those in the know temper their enthusiasm.

"There isn't any reason for gallium arsenide to replace silicon," says HP's Ilic. "It will complement silicon at the high end for special-purpose applications. But I don't see any reason for silicon to be replaced. If anything, silicon is making major broad progress in bipolar and CMOS."

"If you look at gallium arsenide at the device level," Armstrong says, "it has speed and power which is better than silicon. However, when you get to the chip level, that advantage has decreased because a lot of what determines the performance of a chip has to do with the voltage swing and the capacitance. By the time you put many chips together to form a system, you have further reduced the possible leverage of gallium arsenide because you have to interconnect those chips, and gallium arsenide doesn't particularly shine at that."

Nonetheless, gallium arsenide receives attention for many good reasons:

- It is considered three to five times faster than silicon.
- It has higher resistance to radiation than silicon, making it ideal for military applications and space satellites.
- It emits light, which silicon cannot do.
- It uses less power than silicon.
- It can be used to create lasers on a chip that, combined with fiber optics, promise advanced optical computers.
- It can operate at higher temperatures than silicon.

The higher speeds, lower power dissipation and radiation hardness of the material attracted U.S. Department of Defense spending on gallium arsenide.

Despite the fact that gallium arsenide is significantly more expensive than silicon (a 3-in. wafer of gallium arsenide costs approximately $200, while a similar size, high-quality silicon wafer can be obtained for less than $20), the Defense Advanced Research Projects Agency (DARPA) began to pour money into gallium arsenide research in the 1970s.

A natural for signal processing, gallium arsenide can be found aboard military aircraft receiving, sending and distorting signals.

With DARPA funding, pioneering research at places like Rockwell International Corp. and Honeywell, Inc. as well as many universities underscored the capabilities of gallium arsenide as a potent replacement for silicon in computing, communications and instrumentation. Though gallium arsenide devices, specifically analog microwave and radar applications, have been in use since the 1960s, the evolution of gallium arsenide as a digital integrated circuit is much more recent.

It was not until 1983 that Harris

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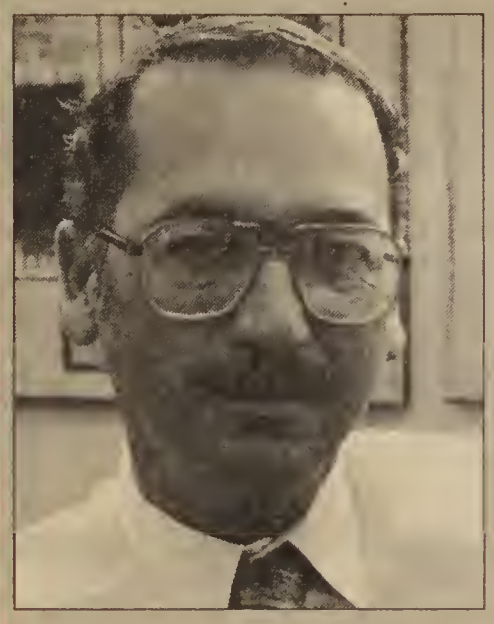

"MIS must avoid buying too much equipment that is bordering on obsolescence and attempt to bring in new capabilities as they appear.

— Gerhard Parker
Intel Corp.

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Japan bets on chip research

By TED WAKAYAMA

The Japanese have built their semiconductor industry on pragmatism. Starting far behind the U.S., Japan did not try to reinvent the wheel or leap ahead by skipping evolutionary stages. It has followed the technological path paved by the U.S. and improved upon it.

However, this approach is changing. Japan is now expanding into the forefront of semiconductor technologies, such as gallium arsenide integrated circuits. This shift in strategy comes partially from the potential threat of other Asian semiconductor industries on Japan's traditional marketplace, but more significant is the role of its national pride. Japan does not want to be known as the country of technology copycats but as technology innovators in the years to come.

This trend is most apparent in the research and development projects sponsored by the Ministry of International Trade and Industry (MITI). In the 1960s and 1970s, MITI's project goals were focused on catching up with U.S. technology, particularly with that of IBM. The majority of the projects centered on catching up with IBM's mainframe technology.

However, this trend began to change in the late 1970s. Recent MITI projects are no longer aimed at catching up with the U.S. but at establishing new technologies for the future. Currently, some of the major research includes fifth-generation computers, parallel processing computers and advanced semiconductors.

In the area of advanced semiconductors, integrated circuits fabricated on gallium arsenide substrates are drawing worldwide attention.

The superior speed and the radiation hardness of gallium arsenide integrated circuits are highly suitable in many military applications, including the U.S.' Star Wars Strategic Defense Initiative. In the commercial arena, because of the high price of gallium arsenide parts, they will not replace silicon as the dominant semiconductor technology, but the power of gallium arsenide integrated circuits will play an important part in computer and communications technology in the 1990s.

Since Japan does not have major defense requirements, research on gallium arsenide integrated circuits is focused on commercial computer and communications applications. Work on gallium arsenide integrated circuits is an important part of the nation's long-term commitment to becoming the leader in advanced computer technology.

Major Japanese computer manufacturers such as Fujitsu Ltd., NEC Corp., Hitachi Ltd., Toshiba Corp., Mitsubishi Corp. as well as the now deregulated Nippon Telegraph and Telephone Corp. are leaders in gallium arsenide integrated circuit technology. R&D efforts are also active at other electronics companies including Matsushita Electric Industrial Co., Oki Electric Industrial Co. and Sony Corp. Their focus for the near term is on using gallium arsenide technology to improve their system-level product positioning rather than selling gallium arsenide chips in the merchant market.

MITI also sponsors gallium arsenide-related research in a number of projects, but most technological achievements are made by private companies. However, this does not mean that MITI's projects are less important.

> ***Its abandonment by the U.S. and now by Japan spells doom for Josephson Junction technology.***

The real impact of MITI's projects has been in setting and coordinating corporate R&D directions. These projects help create national consensus and concentrate corporate efforts in targeted directions.

Among the MITI-sponsored projects, the High-Speed Computing for Scientific and Technological Use project plays an important role in gallium arsenide and other high-speed integrated circuit development. The project targets the development of a system capable of computing 10 billion floating-point operations per second.

The leading candidates for potential high-speed devices for the system are gallium arsenide integrated circuits, High-Electron Mobility Transistors (HEMT) and Josephson Junctions. For this project, gallium arsenide integrated circuits are being developed by NEC, Hitachi, Mitsubishi and Toshiba — HEMT by Fujitsu and Oki; and Josephson Junctions by NEC, Hitachi and Fujitsu.

HEMT is an extension of gallium arsenide technology, using extremely thin, alternating layers of gallium arsenide and aluminum gallium arsenide to increase electron mobility and speed. This structure, called a superlattice or heterojunction, can also be used to integrate monolithically optical and electronics functions.

Integrated circuits built with the HEMT structure have achieved as

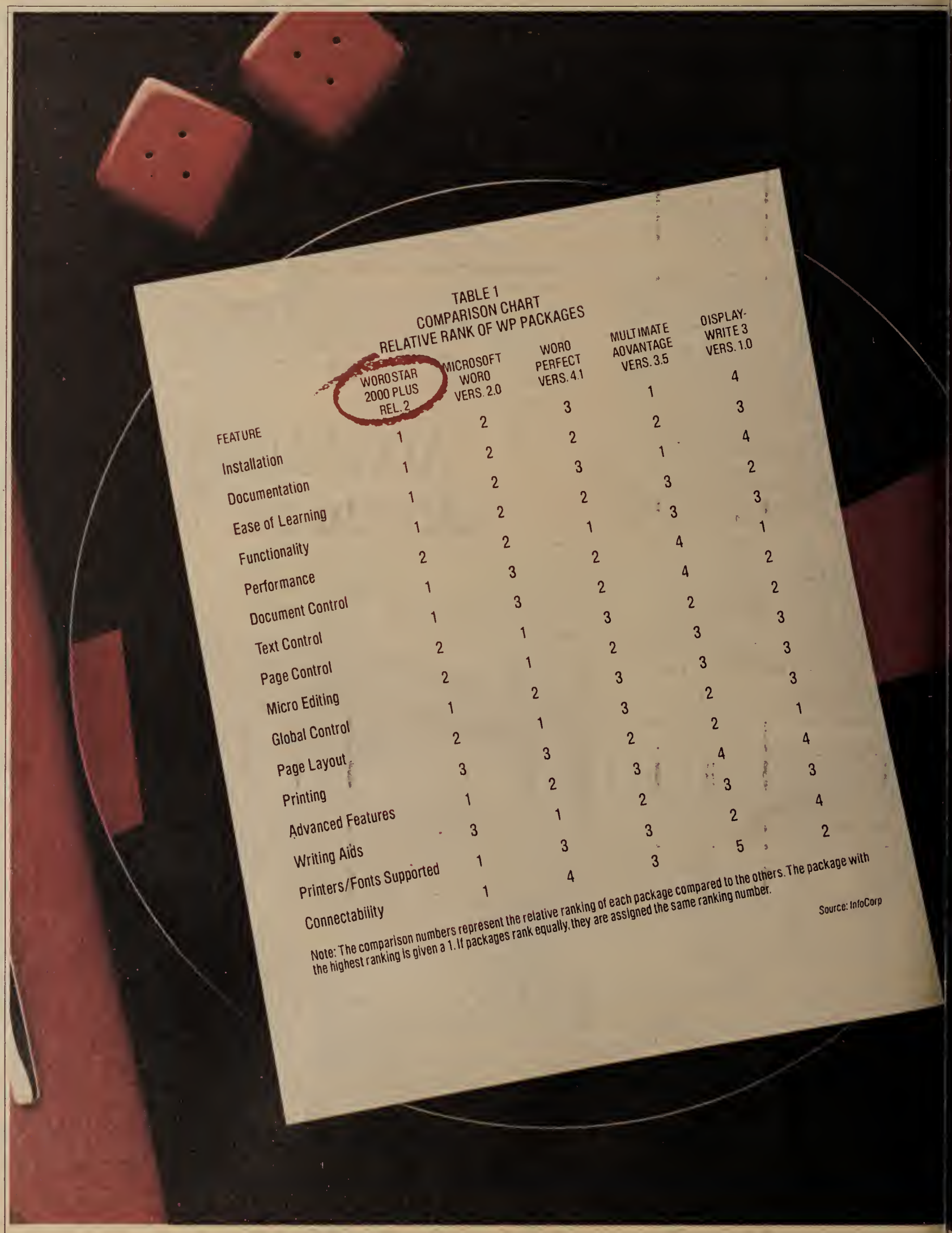

TABLE 1
COMPARISON CHART
RELATIVE RANK OF WP PACKAGES

FEATURE	WORDSTAR 2000 PLUS REL. 2	MICROSOFT WORD VERS. 2.0	WORD PERFECT VERS. 4.1	MULTIMATE ADVANTAGE VERS. 3.5	DISPLAY-WRITE 3 VERS. 1.0
Installation	1	2	3	1	4
Documentation	1	2	2	2	3
Ease of Learning	1	2	3	1	4
Functionality	1	2	2	3	2
Performance	2	2	1	3	1
Document Control	1	3	2	4	2
Text Control	1	3	3	2	2
Page Control	2	1	2	3	3
Micro Editing	2	1	3	3	3
Global Control	1	2	3	2	1
Page Layout	2	1	2	2	4
Printing	3	3	3	4	3
Advanced Features	1	2	2	3	4
Writing Aids	3	1	3	2	2
Printers/Fonts Supported	1	3	3	5	2
Connectability	1	4	4	3	3

Note: The comparison numbers represent the relative ranking of each package compared to the others. The package with the highest ranking is given a 1. If packages rank equally, they are assigned the same ranking number.

Source: InfoCorp

Wakayama is vice-president of research and development for Strategic, Inc., a Santa Clara, Calif.-based research firm.

much as 50% speed improvement over gallium arsenide integrated circuits at room temperature, and an improvement of two to three times at liquid nitrogen temperature (minus 196 degrees Celsius). Several similar projects are under way in the U.S.

Faster than HEMT is the Josephson Junction, which offers a speed improvement of 20 to 50 times that of silicon. However, it requires new fabrication technologies and necessitates cooling the device down to the temperature of liquid helium (minus 269 degrees Celsius). These difficulties have caused IBM, once a leader in Josephson Junction technology, to discontinue the development for more immediately producible gallium arsenide integrated circuits.

Because the MITI project calls for the construction of a prototype system to be initiated in 1988, development must be completed next year.

> ***Japan is no longer the king of mass-production technology; other Asian nations, particularly Korea, are catching up fast.***

Development of Josephson Junction devices has been delayed, and, according to the latest news from Japan, the device has been eliminated as a viable candidate from the project. Abandonment of the technology by the U.S. and now by Japan spells doom for Josephson Junction technology. MITI's decision casts another vote of confidence for gallium arsenide integrated circuits to be the technology for the next generation of semiconductor devices.

To many U.S. companies, more important than Japan's work in advanced semiconductor technology is Japan's progress in current silicon technology. The strength in Japanese companies' fabricating higher integration-level chips at lower cost has made them a dominant power in memory integrated circuit markets.

In the dynamic random-access memory (RAM) market, the Japanese virtually wiped out U.S. companies with 256K-byte dynamic RAM. The announcement of 1M-byte dynamic RAM has been anticipated for a few months, but Japanese companies are in no hurry to introduce it in the U.S.

After the great losses in 64K-byte and 246K-byte markets, U.S. suppliers are not likely to become major competitors in the 1M-byte dynamic RAM market. Also, because 1M-byte dynamic RAM chips will potentially reduce the market for 256K-byte dynamic RAM, Japanese companies could lose more by hasty introductions.

The U.S. Department of Commerce's recent decisions on integrated circuit dumping charges against Japanese companies also affect the introduction of 1M-byte dynamic RAM, as well as the tactics of Japanese integrated circuit suppliers. Production of integrated circuits in the U.S. by the Japanese is likely to increase to avoid U.S. duties.

Duties on imported chips may slow Japan down for the short term, but as production technology of silicon integrated circuits becomes less and less "black magic," U.S. integrated circuit suppliers will continue to face tough competition from overseas suppliers. If integrated circuit prices are lower in foreign countries, U.S. integrated circuit buyers will continue to move their purchasing or initial assembly offshore to take advantage of less expensive Japanese integrated circuits.

However, Japan is no longer the king of mass-production technology; other Asian nations, particularly Korea, are catching up fast. For low-price, high-volume integrated circuits, such as memory chips, those that can sell at lower prices will lead the market. Others must concentrate more on advanced technologies.

The next decade will be a difficult time for the Japanese integrated circuit industry. It must defend the market against other low-cost manufacturers, while continuing its research in advanced semiconductor areas to compete against U.S. suppliers. ■

Correction

Because of an error in production, Relational Database Systems, Inc.'s Informix-SQL was inadvertently omitted from the chart highlighting minicomputer/mainframe data base management system vendors [CW, March 31]. The information that should have run is as follows:

Relational Database Systems, Inc.
4100 Bohannon
Menlo Park, Calif. 94025
Informix-SQL
Number installed 40,000
Type..... Relational DBMS
Hardware..... AT&T, Digital Equipment Corp., Altos Computer Systems
Hardware size ..... Microcomputer to mainframe
Price ..... $795-$48,000
Informix-SQL is a menu-driven relational DBMS with interactive query, screen-oriented data entry, relational report writer, audit trail, recovery and data base administration utilities. The product supports an SQL compatible with IBM's.

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In a comparative report—the report containing the chart to the left—Robert Lefkowits of InfoCorp said:

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Continued from page 57

Microwave Semiconductor, Inc. of Milpitas, Calif., introduced the first commercially available digital integrated circuits.

Since then, a spate of start-ups such as Gigabit Logic, Inc. of Newbury Park, Calif., Vitesse Electronics Corp. in Camarillo, Calif., and Spectrum Technology, Inc. of Holliston, Mass., began to fight for a piece of the projected multibillion-dollar market in the next decade.

Companies such as M/A-Com, Inc. of Lowell, Mass., have been growing and selling gallium arsenide to both the analog and digital markets for more than 20 years. M/A-Com provides design and foundry services as well in its new $25 million plant in Lowell, the nation's largest such facility.

Robert Walline, M/A-Com vice-president, warns that, despite the lure of a lucrative market, gallium arsenide is a tough and expensive business to enter today.

"You need a vibration-free building with extensive clean room facilities and temperature and humidity controls," Walline says. "We spend $100,000 per month on electricity just to keep the air moving. The entry fee now to get into the gallium arsenide business would be $30 million minimum."

Even as the doubters question its ability to replace silicon, gallium arsenide continues to provide a foundation for research into unexplored territory. Varian Associate's Powell predicts that at the outset it will be used selectively but that eventually uses in supercomputers and optocomputers will make it more prevalent.

Supercomputer makers such as Cray and Fujitsu Ltd. have publicly stated intentions to use gallium arsenide for upcoming machines. Other Japanese computer makers are expected to follow suit (see story page 58).

Cray plans to follow its recently announced Cray-2 with a gallium arsenide-based Cray-3 by 1988. With 500-MHz clock speeds and switching times of 2 nsec, the machine is planned to be twice as fast as the Cray-2.

According to Steve Nelson, director of research for Cray, gallium arsenide will be used only in the logic portion of the CPU. The large main storage area will remain in silicon.

"The Cray-2 stores 256 million words, not bits, of main memory," Nelson says. "You couldn't do that with gallium arsenide. There aren't that many working bits of gallium arsenide in existence now."

Nelson remains cautious about gallium arsenide and will not pin down a date for the appearance of the Cray-3. "The main obstacle you face with gallium arsenide is that it's not nearly as mature as silicon, and there are questions about what kind of yields and packaging you can get with it."

Cray is hedging its bet by working with conventional silicon technology on its Cray Y-MP follow-up to the X-MP.

Tony Livingston, vice-president of marketing and sales for Gigabit Logic, predicts that by 1990, digital applications of gallium arsenide will overtake analog, and computer applications will emerge as the largest consumer of gallium arsenide logic and memory circuits.

"We may only capture a small percentage of the integrated circuit market in the 1990s, but that will still represent a multibillion-dollar market," Livingston says.

According to Powell, only 8% of gallium arsenide integrated circuits currently wind up in computers, but by 1990, that figure will jump to 25%. He predicts an all-gallium-arsenide computer with the power of 100 DEC superminicomputers will be available by 1988 for the DOD's Strategic Defense Initiative Star Wars program.

Industry watchers also point out that IBM has been buying up large quantities of gallium arsenide, and a gallium arsenide product from Big Blue may arrive by 1987.

IBM's Armstrong acknowledges that the company increased purchases of gallium arsenide over the past year, but he insists it is strictly for research purposes.

"It's important to look at it," Armstrong says. "But the whole business has been greatly oversimplified. It is not clear that the advantages at the wafer level repeat at the system level. Gallium arsenide is the right choice in some cases, but you just can't pull out your silicon chips and replace them with gallium arsenide chips."

Indeed, the euphoria surrounding gallium arsenide may well be premature. Besides high cost, the technology is still a quantum jump behind silicon. Gallium arsenide is a combination of two elements — gallium and arsenic — and uses the same production principles as silicon. But it is much harder to get high yields of chips from gallium arsenide, and the density is nowhere near the numbers on silicon.

By 1990, for example, gallium arsenide might have 100,000 components per chip, but by then, silicon may have one billion components. The wafers tend to be brittle and to cleave. Zero-defect gallium arsenide is even more expensive and harder to come by.

Other economic factors work against gallium arsenide. Powell notes that virtually all the important companies in the gallium arsenide business are privately held; most of the publicly held companies have no more than 1% of their assets in gallium arsenide research.

"A lot of times, the driving force

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behind a technology is the marketplace and the stockholders," Powell observes. "So in the public sector, there is very little that investors can do to drive gallium arsenide forward."

Powell attributes the situation to the nature of start-ups. He also says he believes that major companies are justified in being conservative.

"Maybe 3% of the integrated circuit business will be gallium arsenide, so if you're a major company, you don't want to put all your resources into something that's got 20 to 1 leverage in the wrong direction," Powell says.

□ □

More ideas, more choices

Researchers, seeking ways to take advantage of the best of both worlds, are succeeding in growing gallium arsenide directly onto silicon. A group of researchers at the University of Illinois, lead by Professor Hadis Morkoc, made recent headlines by coupling the two semiconductor materials.

"If you could get the advantages of gallium arsenide and put it on a silicon substrate, it would be very, very exciting and important," says Venky Narayanamurti, director of solid-state electronics research at Bell Labs in Murray Hill, N.J.

Bells Labs, Narayanamurti points out, is trying to grow several different materials on silicon. Progress has been made in growing germanium, cobal silicides and nickel silicides on silicon. "It is still very much in the research stage, but there is tremendous potential," Narayanamurti says.

Bell Labs and other research centers like Xerox PARC are also attempting to grow insulators, such as calcium flouride or barrium flouride, on silicon, which itself is not a great insulator.

Not everyone, however, is enamored of this research. Technical problems occur during the process of trying to grow gallium arsenide on silicon.

According to Robert Burnham of Xerox PARC, the two materials are not lattice-matched in their molecular structure, so great strain is put on the resulting device.

Attempts to grow a buffer layer in between to relieve the strain have been of limited success.

M/A-Com's Walline is also not convinced that there is any particular advantage to this coupling. "I'm not sure what you are trying to combine," Walline says. "What problem are you trying to solve? For optical integrated circuits, there is a need for some integration of the two, but otherwise, why bother?"

For those watching the industry carefully, there remains a clear distinction between blue-sky research and practical systems solutions. While gallium arsenide continues to make advances in both cost and performance, the key to its success is always going to come back to the problems it might solve.

"The adequacy of any semiconductor material is a function of the device being made," Walline states.

Gallium arsenide may someday move down toward the personal computer level, but, Walline points out, "probably not until after I'm dead."

> ***'If you could get the advantages of gallium arsenide and put it on a silicon substrate, it would be very, very exciting and important.'***
>
> — Venky Narayanamurti
> AT&T Bell Laboratories

One reason why IBM and now, apparently, the Japanese gave up on Josephson Junctions was pioneering work being done in HEMT. The device was first engineered in Bell Labs in 1978; the Japanese quickly began development work of their own.

Early results are very positive. Bell Labs, in collaboration with Cornell University, demonstrated a version of a HEMT last December that ran at 5.8 picoseconds at the temperature of liquid nitrogen, 77 degrees Kelvin.

Several universities and research labs are at work on versions of HEMT. They are called various names — such as modulation-doped Field-Effect Transistors (FET) or Mod FET.

Based on gallium arsenide wafers and impurity-doped gallium aluminum arsenide, HEMT employ submicron components and exceptionally high quality control of materials.

The essential premise of a HEMT is that doping, or the introduction of ions to change the structure of a material, increases the collision frequency of the electrons and decreases their mobility.

Thus, the HEMT separates the dopant ions from the conduction electrons by using different layers of material. A channel is then created that has a high concentration of electrons without the scattering effect introduced by doping. If such a

Continued on next page

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Continued from previous page
device could be effectively introduced into a system, the speed possibilities would be staggering.

According to Narayanamurti, the same principles of HEMT could apply to silicon, and Bell Labs has created Mod FETS using germanium on silicon. "There has been continuous progress throughout the world in this area," he says. "It is very exciting."

□ □

Optoelectronics: A leading contender

Though still very much in the laboratory stages, the idea of an optical computer system is growing in popularity and scope.

Success with communications via fiber optics encourages researchers to use lasers rather than metals on a chip for semiconductor-type capabilities. Work is being done in parallel processing using fiber optics rather than silicon.

"There are lots of beautiful things about working with light when you start talking about a chip," Xerox's Burnham says.

"You could have two optical fields pass each other. You can have an optical field and current flowing, and the current will not affect the light as it does on a standard chip. And you can have many lasers on a chip with different wavelengths," he says. "That would allow you to move light around on the chip and transmit many optical pulses of different wavelengths down the same optical fiber simultaneously."

The use of light opens many doors in hypothetical research. Three-dimensional chips, already on the drawing board in research labs here and in Japan, would operate much more easily using fiber optics because the interconnections would be so much simpler to obtain.

According to Burnham, the optical communications networks being installed today will allow great flexibility in the future.

Ten years from now, he says, instead of adding 10 more lines, one could simply couple 10 lasers with different wavelengths into existing fiber-optic lines to produce the desired results.

Light sources also offer potential for superior chip-to-chip interaction, a source of great bottlenecks now for semiconductor devices. Researchers are employing gallium arsenide in experiments in optical computing simply because it emits light and silicon does not.

Though much work is being done, such systems remain drawings on the blackboard.

"We're working on demonstrating the capability, but we're not there yet," Burnham states. "I'd expect to demonstrate it within the next three years. It sounds like it ought to be easy to do, but it involves all new technologies. It isn't easy to make an optical wave guide inside a crystal and still keep the integrity of everything else you want.

"We think that the techniques people have come up with so far for making optical wave guides stink," he says. "It's one thing to demonstrate it. It's another thing to do it in a way that's elegant enough so that it will succeed as a future product."

□ □

Biochips: The doorstep to the future

Someday, a generation away perhaps, computers may become organic rather than electronic. Small pockets of researchers are building models for so-called biochips or neural networks that approximate the human mind rather than the mathematical and computational machines of today.

Microchips made of proteins and manufactured by E. Coli bacteria are futuristic considerations and little more. But the idea of organic computers is intriguing. The density of molecular packing is so great that in theory, a computer could be built the size of a sugar cube with 10 million times the memory of today's machines.

These biochips may be little more than science fiction, but places like Bell Labs and IBM Research Center have begun work in the area.

Bell Labs scientists recently created mathematical models for neural networks — reportedly highly interconnected electronic circuits that may describe the way nerve cells interact to solve problems.

These networks, according to Bell Laboratories, process information continuously and collectively, not bit by bit as do conventional digital computers.

Theories of parallel processing fit neatly into this research. According to HP's Ilic, the entire design and fabrication of chips must change to take advantage of parallel processing.

"If you look at the human brain, most of the functions have to do with connecting different parts; there's not a lot of processing per se," he explains.

The connectivity that would parallel biological systems is not currently available on computer chips, and it will take that kind of process to make such biological computing a possibility.

At Bell Labs, several scientists designed a 900-neuron network that they simulated on a conventional computer.

"We're not trying to copy the brain or reverse-engineer a garden slug," says a Bell Labs scientist. "But nature has shown us there have to be other ways to design a computer." ■

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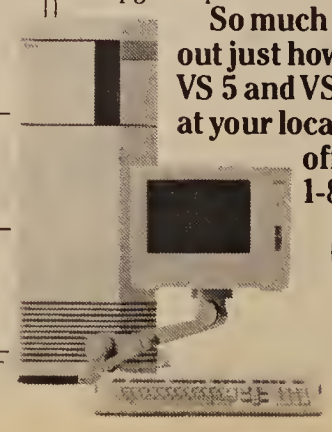

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In Depth

PHOTO BY GEOFF O'CONNELL

Interview: Ed Landry

Making office connections at John Hancock

"We want the user to take over, to participate in the evaluation, to buy into the technology solution emotionally and every other way."

Edward Landry has been director of office automation at John Hancock Mutual Life Insurance Co. since July 1984. John Hancock functions under an unusual structure that separates Landry's OA department from end-user computing, which is DP's responsibility, as well as from telecommunications and the information center. John Hancock is in the middle of evaluating major departmental processors, a project of great importance to company office automation. Computerworld *Features Director George Harrar recently interviewed Landry at John Hancock's Boston headquarters.*

What is the status of office automation at John Hancock?

The next big strategic effort for office automation and information services is connectivity. We've made an enormous investment in technology — hundreds of PCs spread all over the company and departmental systems — but how do we connect them?

What I am testing right here on my desk is exactly what we *don't* want to happen. Here is a Wang Laboratories, Inc. office terminal. I also have an AT&T integrated voice/data terminal and an IBM Profs [Professional Office System] terminal. If I choose to, I can toggle into IBM's Personal Services and try that flavor of electronic office. So theoretically, I have four different places where I can get information electronically. That lack of integration is what we're trying to solve.

You have not made a choice yet between the departmental processor and the local-area network?

We have put in a couple of PC networks. Our strategy is to treat them potentially as throw-away solutions. They may not be thrown away, but they are treated as a short-term solution to an important need. We hope to have in place a premises network, to which we will have universal connectivity.

IBM's Token-Ring, for instance, could become our corporate network, which would handle the entire corporate office: this tower, the neighboring tower and buildings. We're looking seriously at other solutions — for example, AT&T's Information System Network [ISN].

Recently, we refurbished an old building with AT&T's Premises Distribution System, which uses a fiber [optic] backbone. Every workstation in that building, whether it is occupied or not, is wired for both voice and data. So if you move from workstation A to B, the network is in place. That's the kind of total solution that we would like to see.

That kind of solution is not applicable to a building such as this Hancock tower, already built and wired?

Ideally, we would would like to find a solution where we could use the cabling that's already in the floor. This building has a lot of unused twisted pair. If we could reallocate some of that existing wiring to handle our data network needs, that would be terrific. But we're a ways off from making a decision.

You would be running data on twisted-pair wire?

It could be a good opportunity. We don't know at this point.

How do you evaluate options which are often untested solutions?

A task force is responsible for making recommendations relating in any way to technology and networking. It includes strategic planning people, information services, technical services people, data communications, telecommunications, office automation — anyone who has anything to say about

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> ***We're working from the assumption that every large company like ours must have a corporatewide electronic mail system. Some people may not immediately appreciate the full benefits of that kind of a system. But once it's in place, benefits that none of us can anticipate today will jump out.***

technology. We will meet at least once a month, off premises, to discuss strategic issues and do joint planning so that we know what our needs are and can adjust with technology.

Does this task force make decisions itself or recommend to someone else?

Both. What we would like to do — and we're starting to — is to bring out key decision makers who are interested, for example, in implementing networks around the country or changing existing networks. We will work closely with them, discuss their needs, be a technology consultant group on opportunities and alternatives.

The task force shares problems and tries to come up with solutions that make sense from the DP side, telecom side, OA side. There is so much overlap in these relationships that we have to do common planning. The day is long gone when one of these groups would go off on its own and plan in a vacuum.

Who is driving your effort at connectivity and integrating voice and data — end users or the OA department?

Sometimes users will come to us with specific problems. Other times, we have a solution in search of the problem. We're working from the assumption that every large company like ours must have a corporatewide electronic mail system. Some people may not immediately appreciate the full benefits of that kind of a system. But once it's in place, benefits that none of us can anticipate today will jump out, and the corporation will benefit substantially. We have a corporate mandate to develop these systems.

What can you envision as possibilities for electronic mail?

We cannot implement a uniform, one-vendor, one-system solution for the company. There will be multiple solutions. If the user happens to be on Wang systems, probably they will end up implementing Wang's integrated office solution. If the user happens to be on IBM, then they will probably be interfacing either with Profs, Personal Services or a combination. The user in some cases may have the opportunity to opt for any of these interfaces.

For example, from this AT&T terminal, I can access AT&T's electronic mail or Wang Office the same way I can from this Wang terminal or access Profs the same way I can from this IBM terminal. What I'm suggesting is that from this one terminal I can access at least four different integrated office solutions.

We want to have a corporate electronic mail capability which would be so integrated that one could send mail to any user in this company and not care what system he is on — it is transparent.

We don't want to worry that he is on node five or node eight. We just want to send mail. Maybe it's to a distribution list on multiple systems. The system will manage the whole process, make that distribution so that it goes to disparate systems, each user receives the mail and can, eventually, edit that document. That part is down the road a bit. Right now we'll settle for messaging.

How far away are you from universal messaging capability?

We will grow into it. We can do some short-term things. For example, we will probably network Wang computers and test and implement Wang Office in that

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environment. We will begin to implement IBM Personal Services as a pilot test. In the short term, we could tie our Profs community of users, 300 or 400 of them, to that Wang Office community. All of a sudden, we would now have an electronic office where 1,000 or 1,500 users could participate in a system.

Is this going to be long-term? I don't know. But it is a neat short-term solution to integrate two different communities of users.

We continue to look at systems integrators such as Soft-Switch, Inc. and Software Research Co., which can tie Wang to Digital Equipment Corp. to IBM, pass documents back and forth, handle the document conversions and tie disparate systems together.

So you are not trying to persuade users to give up whatever system they are on?

No. They have made a significant investment in a particular system. Our challenge is to integrate those systems. Why should we force a user to learn an entirely different system, even if it is a better system? Secretaries are trained on a particular vendor's word processing, records processing [system]. Why should we force them to learn a new system and then worry about translating all of those documents from vendor X to vendor Y? That is an unnecessary burden. We want to leverage our existing investment in technology.

Even if those existing systems came into the corporation before an overall plan was conceived, before a technology task force was in place?

Yes, even if it is fully depreciated, fully written off, you can still get significant value out of that system. If it works well and does what the user wants it to do, why not continue to benefit from that system? We do not have a problem with obsolete equipment — yet.

But when equipment does become obsolete, you will expect the user to upgrade within the same vendor's line?

Probably. At that time, we might say, you have spent a lot of time with vendor X. You should also now think about vendor Y and vendor Z because a lot of things have happened. As good consultants, we would review the advantages and disadvantages of the alternatives. But ultimately it is the end user who makes the decision. We do not like — and frequently we are not able — to force decisions.

You would not want that power?

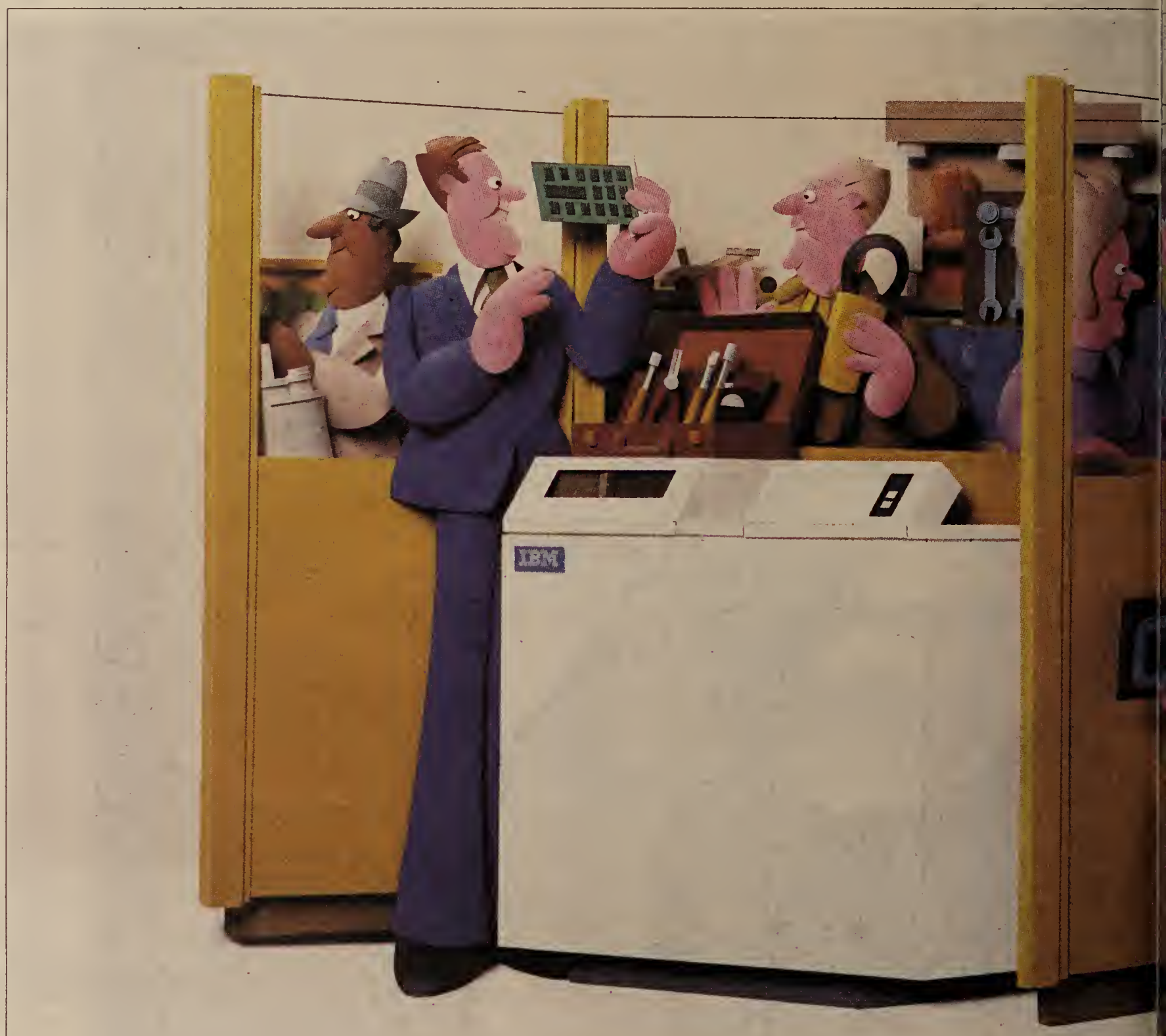
I don't think it is necessary. If a vendor were going to do something really off the wall that did not fit at all into our strategic plans, then we might have to get into some serious discussion.

What do you tell vendors they must have in their systems if they want to sell you personal computers or departmental systems?

A vendor must demonstrate strong communications to our existing systems. We have an enormous investment in IBM mainframe equipment. If they cannot step up to that requirement, they haven't gotten to first base.

In the departmental processing world, they need to integrate the IBM Personal Computers elegantly. Just being a file server for those PCs is nice but only a basic requirement. We would like to see the departmental processor providing strong bridges between the

> ***Our challenge is to integrate our systems. Why should we force a user to learn an entirely different system, even if it is better? Or worry about translating all of those documents from vendor X to vendor Y? That is an unnecessary burden. We want to leverage our existing investment in technology.***



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mainframe and the Personal Computer.

Each of the major vendors offers us interesting scenarios for each of those systems. That's what we're struggling with right now. We have to make that decision soon — this spring. Having said that, if we strongly recommend vendor X, we cannot and will not force that recommendation as the sole solution to the company.

It is not feasible for you to rewire the Hancock tower?

It is, but who wants to? Right now, this building is so full of coax that it is listing to the side.

Our old building is cable-bound. There are places in the elevator shafts and the floors where you cannot put another piece of cable. We are not happy about that.

We want to come up with a solution that will support our network requirements not just for a couple of years but for 10 or 15 years. We think it is doable.

Without pulling out wire and adding wire?

AT&T talks to us about its ISN network. Being able to use existing twisted pair in the walls — that is a solution where we could recycle and take advantage of the cabling already in place. There are some limitations to speed and other issues to deal with.

We have done some networking. We do have a baseband cabling system in this building, but it is mostly to connect IBM 3270 devices to the host. The interesting part is that we can drive terminals that are remotely attached, but we can do it at local channel speeds. So we get very responsive 3270 devices.

What networks do you run?

We have IBM's proprietary PC Network and a 3Com Corp. network. They are both working very well. We will recommend a PC Network where appropriate.

Sometimes the user needs more than a network to manage his data. Sooner or later, a minicomputer/departmental processor becomes a better solution. It is more expensive, but it does not take very long for users to realize they need something more sophisticated than connecting PCs and sharing files. They need data base capability. They need a mechanism to efficiently download data from the host.

It really gets annoying when the vendors say, "Oh, piece of cake. Just download that data from the host." They make it sound so easy. It is not trivial at all. You really need decent software at the departmental level and the PC level to manage that well.

Have you found that decent software?

Cullinet Software, Inc. has a very attractive strategy. We use their IDMS/R data base system for one of our data bases at the host. We can download data sets from that mainframe to the PC using their integrated software, Infogate. We expect them to deliver a minicomputer solution using a DEC VAX or Wang VS and other vendors. We want to see more of that, more of an integrated solution.

Currently, we have the IBM mainframe world with its own operating systems; the PC has Microsoft Corp.'s MS-DOS, IBM's PC-DOS — very different. Then you look at the departmental level, and you have still another operating environment, whether it is from DEC, Wang or IBM. How do you integrate all these so that applications can run at all three levels and appear to the user as one application — "cooperative processing"? No vendor has come close to delivering that environment.

On the applications side, what do you see as the benefits to users of electronic mail?

It's difficult to speculate

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about the total company. In our department, we have been testing a couple of integrated office products. Even though the OA staff members are literally next door to one another, we have found it much more efficient to send one-line bullets back and forth. We are exchanging information much more efficiently.

People used to complain that information did not flow well, no matter how hard we as managers tried to communicate it. Electronic mail cleaned up that communication — scheduling meetings, updating people using distribution lists. It has enormous impact just within our group, and we're in eyeshot of each other.

It will open up lines of communication. Sometimes it is more difficult to get on the phone and make two or three calls. It offers you alternatives. The phone is a two-way conversation.

Frequently, you want just a one-way, nonsimultaneous conversation. Profs has been extremely useful in that way. Unfortunately, a lot of people I would like to communicate with are not on Profs.

Another system we've found extremely useful is voice mail. We're pilot testing AT&T's voice mail offering, the Audix system. That has proved extremely useful, being able to receive a message and forward that information to others.

When I was sick for a week, all of my voice messages and communications were accessed from my home. I responded to people. I called in messages to people who could handle them. My communications didn't miss a beat.

> ***"It really gets annoying when the vendors say, 'Oh, piece of cake. Just download that data from the host.' They make it sound so easy. It is not trivial at all. You really need decent software at the departmental level and the PC level to manage it."***

You called in and heard your messages?

Yes, it has all the functions of an answering machine and a lot more. When you call in, you would think you're getting the standard answering machine on my desk. But if my boss wanted to leave a message for me, he could choose to communicate through the voice mail system instead. He might not want to get into a conversation with me.

I can send one message to my entire staff. Voice mail is going to take off. Anyone can access it with a Touch-Tone phone.

How many end users are on the system now?

Approximately 200. We're right in the middle of making a systems comparison among the major private branch exchange switches. For about 24 months, we'll test AT&T's System 85. The voice mail system is integrated into that.

What about integrating the voice mail system with an office system such as DEC's All-in-One or Data General Corp.'s Comprehensive Electronic Office?

That's ideal. I want to look on one screen and be presented with a list of my mail. My system should say, "You have five Wang Office messages and three voice mail messages. . . ." What I have on my desk now is terrible. I have voice mail here in the AT&T system. I find myself in the silly situation of looking at a Profs message here and then transferring the message to my Wang Office.

This is all a test, of course, but it's unacceptable. I need one place for all my messages. Profs and Wang Office offer messaging, calendaring, mail, reminder lists. Wang Office runs on a Wang computer, whereas Profs runs in our information center, and anybody with an IBM 3270 device can access Profs. The Wang Office is a brand new product, first release, and Wang has told us about enhancements to come.

If you are on the road, can you call in to your voice system?

Yes, that's easy.

Easy from a Touch-Tone phone, but you cannot access an integrated office system.

Not yet, but all the vendors are telling us that they have or are about to introduce a voice interface. DEC has its Dectalk as an interface. We believe Wang is developing a comparable capability so that you can call in to one mailbox, and the system will read your Decmail, your Wang mail, whatever.

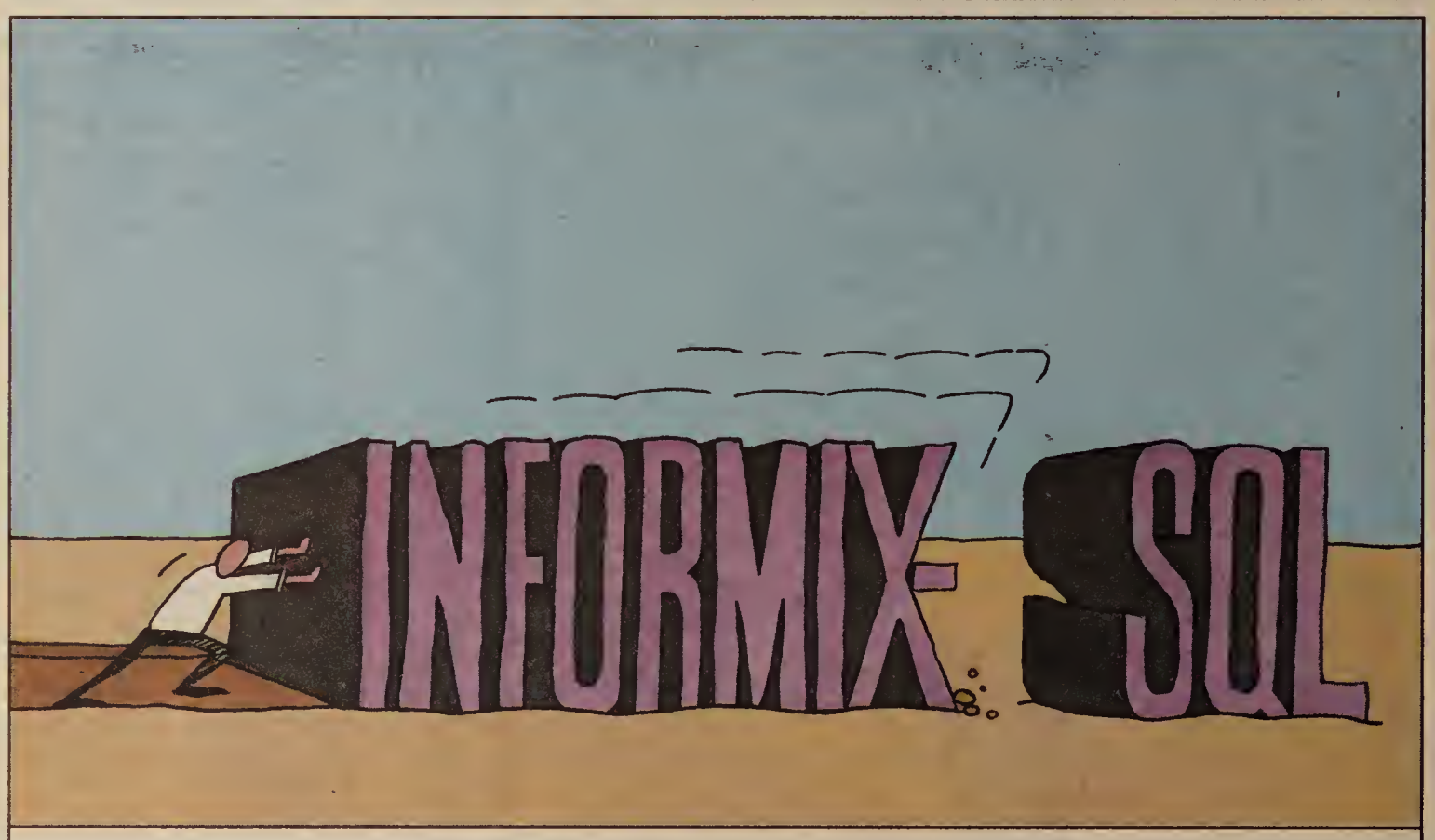
By digitized voice?

That's right. The technology is there. It's just packaging it.

Let's move from technology to management issues. To whom do you report?

That is interesting. We are still under an organization that was established in 1980. I report to the Management Services Department, which is separate from Information Services. Even though we are in separate organizations, which could be perceived as difficult, today we find that joint planning is straightforward.

My Information Services associates work closely with us as well as



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with the telecommunications director, who is also under Management Services.

Telecom and OA are under the Management Services Department, while traditional DP is under Information Services?

Yes, we all ultimately report to the same executive vice-president. On the surface, you would say that it would be cleaner and more the trend today if we were all in one organization. Frankly, it is academic. It does not impact our effectiveness.

Office automation as a term has had a rough couple of years — in fact the Office Automation Conference was just held for the last time in March.

We are trying to rename ourselves. A lot of what we do is general business consulting. We consult on technology, of course, but we look at the total office needs, work flows, administrative procedures — we have even made suggestions on reorganizing departments. In some cases, we have done consulting work for departments where we didn't even recommend automation.

We are trying to give ourselves a name that reflects our total consulting services. We are not happy at all with "OA." Our overall department is called corporate consulting, which is probably the best name.

That says what we do, but we can't steal the department name. Other companies typically call what we do "integrated office systems" or "advanced office systems." But that's too restrictive to us.

Does the end user know to call you when he has an automation problem or question, rather than calling DP?

It depends. We have touched every area of the company in some fashion. We are trying to market ourselves to the whole company. Some areas have had the advantage of our advanced consulting.

Others think of us as the word processing people or the PC gurus who do everything from the hot line to the ordering of the PCs to evaluating hardware and software.

So you are at the forefront when it comes to Hancock employees using computers. They see you, rather than the data processing department?

They see both. They may want to do end-user computing on Information Builders, Inc.'s Focus, which we use in our information center, and time-share the cost. Or they may come to us first, and we may find a better solution.

Would you implement that solution, too?

No, if it is an end-user solution, we would refer them to our end-user services department which is within DP. If the information center is the best solution, we refer the users there. On the other hand, if a PC solution is best, then they are referred here.

The information center is under Information Services? Is that the way you prefer it?

It is not the way many companies are organized today, but it works well here.

There doesn't seem to me to be a natural boundary between end-user computing and personal computer use.

It can appear artificial.

Our philosophy is to recommend the technology, give the users a game plan for the technology, make sure they get trained properly either internally or through external sources, and then let the users take over that technology and manage it without our direct support.

If our group tried to manage and direct support for all the computing that we're responsible for recommending, we'd need a staff of 100 people.

We want the user to take over, to participate in the evaluation, to buy into the technology solution emotionally and every other way. They might come back to us and say they want to expand or change the system or evaluate third-party software, for instance. Sure, we're glad to help. But please, don't expect us to be your systems analyst. We can't roll up our sleeves and spend 40 hours a week with you.

But DP might?

They may.

Does it make sense for the OA department to stay separate from DP?

I think someday we will merge, but who knows when or how. ■

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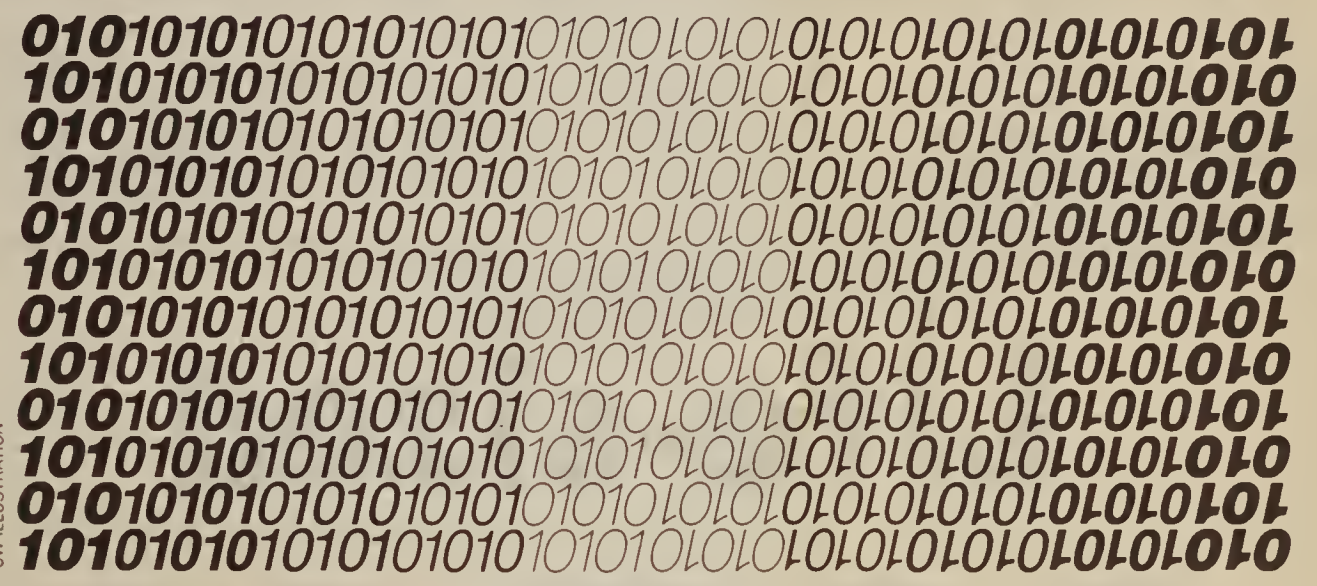
In Depth

Live file conversions: One chance to succeed



CW ILLUSTRATION

Handling crucial files during a live conversion should not be left to a junior-level staff member. The glory of a perfect file conversion may fade in a few days, but companies often live with the effects of less-than-perfect file conversions for years.

By MARVIN GOLDSTEIN

Countless organizations suffer the throes of conversion from an existing computerized application to another, equivalent package. A variety of players participates in these conversions, depending on whether the change moves the system from servicer to in-house staff, from in-house staff to servicer, from in-house staff to in-house staff and so on.

In addition to the organization needing to learn a whole new method from computer operations through to end-user interfaces — possibly including new equipment and/or operating systems — converting the actual file data from its existing form to that of the new package requires an inevitable step.

File conversions may seem a trivial subject to some, but when you are faced with programming a conversion from 15 different files off a computer foreign to your experience, which processes the application much differently from the one you are converting, the problem can seem overwhelming.

One thing is for certain: The task of file conversion — however simple — should not be placed into the hands of a junior-level person. Although file conversion is a one-shot programming effort, by the same token, DP has only one chance at perfection.

Goldstein is vice-president of special projects at Astradyne Computer Industries, Inc. in Garden City, N.Y. As a conversion specialist, he has been directly responsible for more than 30 conversions for banking institutions. This article is excerpted from a longer piece, "The Raptures of File Conversions."

After a live file conversion, the company cuts over to the new system. Erroneous data on the output files can wreak havoc on the new system for a long time to come. Add faulty data to the general problems stemming from other areas of conversion to a new system, and DP can anticipate a disaster.

The effects of an imperfect file conversion may live with you a long time, causing much agony and possibly costing your job. In contrast, the glory of a perfect file conversion is very short-lived — lasting only for the day or two it takes to convert the files and prove out the results.

I describe the results of a perfect file conversion using the "squeezed lemon theory"; that is, you are quickly used up and discarded as one would a squeezed lemon. Your shot at perfection is soon forgotten. In some cases, after hours or days of preconversion phone conversations, the end user does not even call to say hello.

Objective of a conversion

The ultimate objective of a file conversion centers on developing magnetic files in a form, manner and structure acceptable to the new package. When completed, the new files should be processible by the new package as if they were the next day's work.

With proper forethought and scheduling, DP can reduce the number of files and/or the amount of data that needs to be converted. Eliminating off-line files that can be initiated by the new package and timing the conversion with normal cutoff dates offer two examples. The less that has to be done to convert to the new package, the less chance for error and the faster the cutover.

At least two parties are involved in

any file conversion — the party being converted (the convertee) and the party doing the conversion (the converter). When the convertee is being serviced by a third party, the servicer must inevitably become involved, if only to supply information about the physical and structural elements of the files being submitted for conversion.

In general, the levels of knowledge about the old and new packages will differ dramatically between the parties. At the least, the converter must know the intimate details of the files and fields involved in the new package. By the same token, the convertee, possibly with the aid of the servicer, must have an equivalent knowledge of the old package.

Together at a face-to-face meeting, the two parties swap information and knowledge. It is the converter's responsibility to orchestrate and lead the meeting by advising the convertee about data required by the new package. It is the convertee's responsibility to provide details on where data can be found or developed from the existing files.

> ***Probably the worst layouts a converter can receive are Cobol record definitions. For some obscure reason, the suppliers of Cobol record definitions seem to take a certain insidious pride in giving the converter clean computer printed pages with field names known only to themselves.***

To a large degree, the burden rests with the convertee. If the convertee cannot successfully impart the information requested by the converter, the conversion will either be delayed or prove to be incorrect.

Physical and structural viewpoints

The first step in considering the programming requirements for a file conversion is for the converter to investigate the files available for conversion from a physical and structural point of view. For simplicity, let us assume that such files exist on a magnetic medium. Obviously, the converter must be familiar with the computer and related peripherals.

If the conversion comes from an equivalent computer, the staff should not run into difficulties understanding file conventions (labels, sentinels, character codes, signing and so on) and how to manipulate files on the various input devices.

However, in about half of the conversions I have handled, the files came off a computer with which I had little or no experience. In these cases, the converter must be a seasoned veteran to determine a mutually agreeable format and structure for files submitted.

'Sensitive sign snafu'

As seasoned as one might be, there is still room for error. In a conversion I call the "sensitive sign snafu," I made a decision that led to a small disaster fully five months after a conversion I performed for a bank.

The conversion pulled files from an IBM EBCDIC computer onto an ASCII computer. About five EBCDIC tape files were involved. In IBM EBCDIC, a packed signed field is structured the same as a packed signed field in ASCII, in that the 4-bit packed numerics are followed by a 4-bit sign in the lower order half-byte.

Common to both character code sets, a negative sign is hexidecimal D. Conventionally, in IBM EBCDIC a positive sign is hex C, and in ASCII, a positive sign is hex B. On the ASCII computer, any hexadecimal configuration in the sign position that is other than a hex D is treated as positive.

This was the source of my problem. When converting an input packed signed field, I left the sign position in an "as is" state to avoid the additional coding necessary to convert positive signs to the conventional hexidecimal B. Without making it sound like an excuse, I must say I did advise everybody concerned how I was handling the signs. There were no rebuttals, so I proceeded as intended.

The conversion went beautifully. The figures were in proof, and the converted file was put into production with no hitches. The error had yet to surface.

In production, interest is credited to each account at the end of each calendar quarter, and the new account balance is brought down into an area of the account record as a starting transaction history figure for the next quarter. These history amounts are used for possible recalculation of interest during the quarter.

At the end of the quarter in which the conversion was done, there were no apparent problems. The account balance brought into this recalculation area was one of those converted packed signed fields with a hex C in the sign position. Still no apparent problems occurred during the next quarter.

At the end of this next quarter when interest was credited — five months after the conversion — the disaster struck. On about 1,000 accounts, the credited interest was completely wrong.

Why these accounts and not any of the others? What was the common link? How could the conversion

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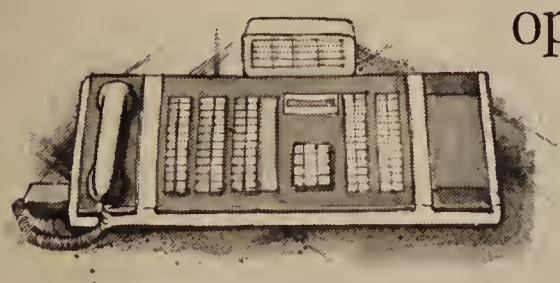

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programming be suspect after so long a time?

It took a good amount of investigation to discover that during the quarter, certain transaction activity on these accounts forced a recalculation of interest — a normal but infrequent situation. However, unbeknownst to anybody at the time, the recalculation routine did not test history amounts as whole fields to determine positive or negative states but, rather, fiddled with sign bits under the assumption that they were the conventional ASCII sign configurations.

The upshot was that the correct interest had to be manually calculated and entered onto the file, the file had to be fixed to use conventional signs, and the customer's feathers had to be unruffled.

The good things that came out of this conversion were the following: The Mickey Mouse bit coding was subsequently changed to more rational and flexible code, and I never again left converted signs in an unconventional state.

Tactful requests

Where the files to be converted come off a computer incompatible with the one designated to execute the conversion programs, the best common medium is magnetic tape. The converter must ask tactful questions to simplify the programming task, such as the following:

- I would like the tape data in record form. A direct disk dump would be meaningless to me since I am not familiar with the format. The best that I can handle is 9-track, 1,600 bit/in., phase-encoded tape. Can you supply it?
- Will the data be coded in ASCII, EBCDIC, BCD or what? Can you supply a character binary configuration chart?
- What are your labeling, tape mark and partial last-block fill conventions? Are the records fixed or variable in length? If fixed, what are the record and block lengths? If variable, what are the minimum and maximum record and block lengths? Do block headers exist? If so, what do they look like?
- What variety of data field formats exist — character, packed, binary, hexadecimal and so on?
- On what basis, if any, are the records sequenced in the files? Are the files independent, or are they in some way dependent in that certain pointers or codes from the records in one file are needed to determine where to find or whether or not to process related records in another file?

When discussing files, the converter should remember that, as much as you may not understand the file supplier's equipment and mode of operation, the supplier may not understand or care about yours. The important thing is for the converter to gauge the temperament and general knowledge of the file supplier in order to determine how much can be brought out without provocation while leaving room for further cooperation.

Understanding record layouts

The next prerequisite step in a file conversion is gaining an understanding of the record layouts. This represents the most important step in the entire conversion process. In my opinion, a record layout should, at a minimum, describe each field in each record as follows:

- A very brief description or clear descriptive name.
- Starting relative byte position.
- Length in bytes.
- Data type — character, packed, binary or other.
- Assumed decimal point.

If the record is variable in length, the base or fixed portion of the record should also be noted. Show the variable portion, usually referred to as segments or trailers, as individual subrecords with each field relative to the beginning of the subrecord.

The problem with record layouts is that they are submitted to the converter in a variety of forms. Some are clear, clean and comprehensible. Others are pulled from a programmer's workbook with cross outs and handwritten notes and are dated three years back, leaving more than a little doubt as to their accuracy. Some are photocopies from a program listing in an unfamiliar format.

Regardless of the form in which record layouts are supplied, the urgency to understand them is imperative. Probably the worst layouts a converter can receive are Cobol record definitions. For some obscure reason, the suppliers of Cobol record definitions seem to take a certain insidious pride in giving the converter clean computer printed pages with field names known only to themselves (such as LN-3x5-MO, C-DST-DEL or SV-ACCT-7), spread over five or six data levels with almost as many redefines as there are data names.

From a file conversion point of view, the inadequacy of Cobol record definitions lies in the fact that the converter must at some point determine the relative starting positions of the fields in the records ultimately to program, read file prints and view dumps. Cobol record definitions do not supply this information.

Detail specifications

With an understanding of the input files, records and fields, the converter stands ready to proceed with the details of the file conversion — that is, how to satisfy the informational requirements of the new package with the data from the convertee's files.

This is the most tedious, enlightening and acrimonious part of a file conversion. It is tedious in the sense that it generally takes many hours of head knocking to complete the task.

It is enlightening in that the convertee develops a much better understanding and awareness of the

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> ***An important strategy under which the converter should operate is to question the information imparted by the convertee, rather than accept it immediately as gospel. It does not take long for the convertee to realize that the converter's strategy is not intended to make him look foolish but to serve as a protective device for both parties.***

nuances and capabilities of the new package. It is acrimonious because convertees inevitably discover missing or divergently handled features in the new package — features they "cannot live without or cannot have processed any differently."

Notwithstanding the psychology and politics involved in a conversion, the recommended approach — one I have been using over the years — for developing detail specifications is the field-by-field method.

The converter explains the purpose and function of each field one at a time to the convertee. The converter then asks if an equivalent field exists or, if not, whether it can be developed in some way from another field or from conditions in this field.

By noting the sources in the convertee's files (file, record type, field name and location) and the machinations needed to produce the new field, the converter should be able to conceive of the conversion programming for that field, producing the file conversion detail specifications field by field.

As indicated earlier, the burden lies with the convertee to impart the information requested. The converter can only direct the discussion by telling the convertee what is needed for the new package fields and possibly helping find a way to meet those requirements.

If a servicer is involved, I highly recommend the presence of servicer staff throughout these discussions. The convertee usually does not know all the ramifications of the existing package. The servicer knows (or should know) the entire system and what goes into making up the files.

Knowing the overall scope of the existing package, the servicer generally does not know which facilities and features are being used by the convertee. As is usually the case, the convertee luckily is only using a limited number of features and facilities.

Not gospel

An important philosophy under which the converter should operate is to question the information imparted by the convertee, rather than to accept it immediately as gospel. The way to keep this distance and still move through specification development pleasantly is to note exception reporting and default states.

For example, if the convertee indicates that a field to be converted from his file can only contain a value of "A," "B" or "C," the converter should automatically note an exception reporting situation whenever something other than "A," "B" or "C" is found and, furthermore, should insist on a default value or condition for the new package field.

It does not take very long for the convertee to realize that the converter's strategy is not intended to make him look foolish but rather to serve as a protective device for both parties. This realization becomes apparent when the convertee begins asking for exception reporting on fields that do not require it.

At the outset, the converter must make it very clear to the convertee that the various new package fields under discussion are the sum and substance of what the new package will accommodate.

It is the convertee's responsibility to keep track of essential data not directly provided for in the new package. At the conclusion of the discussions, the convertee should present a list of essential data that must be carried forward to the

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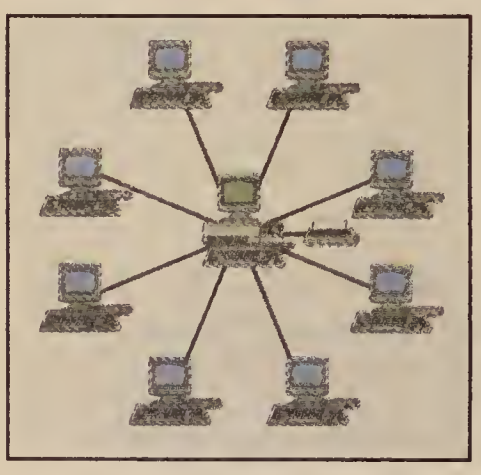

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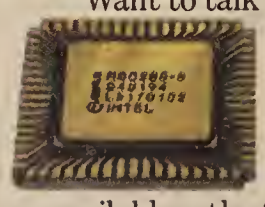

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new package files.

The converter should make every effort to place the data into alternative or substitute fields. If all the data cannot be placed, compromises must be made either to modify the new package or give up the data.

I recall one instance in which the convertee just plain forgot to tell the converter about a field that was not normally part of the new package but was easily convertible. It was not until sometime after the conversion that convertee staff members realized they had lost data that had taken two years and $75,000 to compile.

Part of file conversion specifications should include reporting of totals necessary to prove out the conversion in terms of being able to reconcile counts, balances, hash totals and so on between the input and output files. Totaling is the only way to ascertain that correctly dated files have been accounted for and, to a degree, processed properly.

The development of this area belongs to the imagination and inventiveness of the converter. The converter must investigate what the convertee will have available in the way of meaningful totals to be used as target proof figures. He must then imagine what totals should be produced out of the conversion programming to reconcile with these figures.

Over the years, I have found that regardless of which input fields the converter decides to total, it is most important that, at least in the early tests, all records not specifically targeted to be bypassed are involved in the totaling process. If records such as test accounts, total records or header records exist that were not disclosed by the convertee, they will show up as out-of-proof or garbage total situations.

Signing off

A last step in the development of file conversion specifications occurs when the convertee signs off on the specifications. This is the converter's only measure of protection against his own misinterpretations or being supplied with incorrect information.

Signing off implies an understandable written document from the converter. I recommend that this document be as complete and detailed as possible to serve also as the programming specifications.

For the most part, compiling this document requires a consolidation and rewrite from the rough notes taken throughout the conversion discussions. During the rewriting process, I have discovered inconsistencies, contradictions and illogical situations in the rough notes I had taken. I have also discovered when rewriting from my notes that if a situation cannot be stated clearly in English, it probably cannot be programmed and demands further discussion.

Between specification development and the actual live conversion, changes in the convertee's old package must be expected by the converter. Very little can be done about this situation short of advising the convertee to freeze the old package during this time period. However, this may be beyond the convertee's control if the changes are regulatory in nature or if a servicer is involved.

To avoid massive changes that might prevent the conversion from getting off the ground, the convertee must anticipate and investigate potential forthcoming changes and must schedule a conversion date that will minimize the need to include the changes at that time.

Programming a conversion

Documenting the file conversion specifications extensively reduces the task of writing the programs to an almost clerical effort that can be entrusted to any good programmer trained on the new package. Because the general nature of conversion programming includes bit manipulation, character code conversion and last-minute patching, I insist that the programs be written in a low-level assembler language appropriate to such procedures.

Considering the critical aspect and one-shot use of conversion programs, the style and method of programming is important. Using tricky or sophisticated routines for the sake of saving a few lines of coding or a few minutes in running time is unimportant. The only techniques that need be employed are defensiveness and simplicity.

Defensiveness. When comparing a packed field with an unpacked field, always unpack the packed field rather than pack the unpacked field. This assures the programmer that if, for any reason, alpha information crept into or preexisted in the unpacked field, it will not be lost in the comparison.

When comparing a field equal to N possible values, compare against all values rather than assume that after falling through N-1 compares, equality to the Nth value is implied. If the values were generated by the program, falling through N comparisons would indicate that something went wrong and should dictate an abort.

If stacking of records or table items is required, always check that the stack area memory allocation is not exceeded. If it is, abort the program.

In many conversions, it is difficult to set maximums on the number of records that must be stacked in memory before the related output record or records can be developed. If the memory allocation is exceeded, a recompilation is generally required. Where stacking of program-generated table items is needed, exceeding the memory allocation usually implies a programming error.

If the converted output record is variable in length, it implies a maximum size record. With the addition of each segment or trailer, check that

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the maximum size is not about to be exceeded. If it is, exception reporting plus truncation is usually the only choice.

Simplicity. Almost always in a file conversion there are dates, factors, codes and so on that are dependent on the point in time at which the live conversion takes place. Rather than fixing them in the programs and possibly forgetting to change them if the conversion is put off to an alternate date, the program should call for them from an external source. Needless to say, they should then be displayed for verification.

Inherent in conversions are long lists of code transformations from the old system to the new. Where such long lists exist, tables, rather than long strings of compares, should be set up in the program for simplicity's sake. To provide complete flexibility with the use of tables, the look-up coding logic should be designed to do the following:

- Assume no sequence to the search argument key in the table.
- Assume no particular length to the table.
- Start each search from the beginning of the table, and terminate the search when a sentinel table item is found. Placing a number of sentinel table items at the end of the table automatically allocates memory for patching in additional table items.

Last-minute changes to conversion programs arising from new discoveries by the convertee seem to be the nature of the beast. If the changes are relatively simple, patching the programs rather than recompiling them can save significant time on conversion day. It is therefore important that each program include a patch area and that the coding be as straightforward as possible to facilitate patching.

> ***I have discovered when rewriting from my notes that if a situation cannot be stated clearly in English, it probably cannot be programmed and demands further discussion.***

Testing and verifying

When programming begins, the converter should request to have live files and related proof reports delivered from the convertee's computer center. These files serve a dual purpose: corroboration against the old package file and record layouts and controls for testing the programs.

Corroboration. Upon receipt of the files, the very first step should be to produce a raw print of the beginning of the files, plus enough data to reflect all the different structured records that might exist. Then make conformity checks using the printout. Are the character codes correct? If magnetic tape was used, do label records and tape mark arrangements conform to expectation? Do record and block sizes conform?

Most important, do the records conform to the record layouts — that is to say, are packed fields packed? Are unpacked fields unpacked? Are signed fields signed? Do date fields contain legitimate dates? Do alpha descriptive fields contain readable English? If discrepancies exist, resolve them quickly before programming goes too far.

Test controls. The second purpose of the submitted files is to test out the completed programs to determine how well the files conform to the programming specifications. Assuming the programs work properly, the exception report and printed reconciliation totals should give a fairly good indication of misinterpretations and misunderstandings.

Conveying the results to the convertee, understanding and ironing out problems, adjusting the specifications and running the converted files through critical production programs for compatibility testing are all necessary steps.

I always recommend that after the round of testing and adjustments is completed, a live test file conversion be performed at the convertee's site at least two weeks prior to the actual conversion date. This testing function serves multiple purposes:

- It tests the convertee's computer equipment to ensure it can at least accommodate the conversion.
- It tests the latest old package files to ensure that no unforeseen changes have taken place.
- It rehearses what will happen on the actual conversion day.
- It gives the convertee current converted files from which to run parallel testing on the new package.

Going 'live'

Oh, the stories I can tell about conversion day! If anything exhibits the true meaning of Murphy's First Law, a file conversion does. It would take more than this article to describe some of the ridiculous events I have lived through on those fateful days.

The "Corner Cut Caper" goes back to my old Univac days when punch cards were still in vogue. My group was charged with the task of converting an application involving some several hundred thousand cards for a very large customer. The input equipment consisted of a card-to-tape convertor since the mainframe could only handle magnetic tape.

One of the critical card files containing about 100,000 cards took an excessively long time to get onto tape

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ANTIQUES

because of jams resulting from dog-eared cards, there being a mixture of left and right corner-cut cards in the deck. The card file was specified to be entirely numeric, but subsequent processing on the computer began to reveal occasional records with alphabetic characters in important fields. What to do? From where were the alphabetic characters coming?

Examination of the tape records off the convertor revealed the alphabetic characters at either end of the tape records, always confined to a few column positions. However, the related punch cards showed numerics. Therefore, we assumed, the card-to-tape convertor intermittently malfunctioned.

After two days of ridiculing the maintenance people for not being able to fix the convertor, someone in our group noticed that the punch cards in question were always cut at both corners — very peculiar punch cards.

In order to reduce the number of card jams and without realizing the consequences, the operator had snipped off the dog-ears, creating the equivalent of overpunches in the cards that he snipped too far. The problem was correctable on the computer with fix-up routines, but we lost almost a week in the process.

Uncontrollables

During a job I call the "Phony File Fiasco," we assembled Friday night at the convertee's site for a Saturday conversion. A weekend conversion was required so as not to interfere with normal weekday processing. The tape files to be converted were being created very early Saturday morning by the convertee's servicer about 100 miles away.

A convertee staff member was sent to the servicer Friday to wait for and return with the tapes immediately after they were produced. He returned with the tapes — an original and a backup copy — at about 10:30 a.m. Saturday. The external labels were correct, so we immediately launched into the conversion.

It quickly became apparent that nothing was happening nor was it ever going to happen with either the original or the backup tape. The conversion program would not read either tape. A utility print of both tapes revealed that they were truly duplicates, but a completely wrong file (fixed length instead of variable).

By the time the convertee got around to calling the servicer, the servicer's computer center was closed for the weekend. The convertee did manage to reach the servicer's operations manager at home. After a lot of excuses and apologies by the manager, the convertee was assured that the correct tapes would be ready by early Sunday morning, but the convertee would be required to pick them up as he had before. No more than a few hours were needed to complete the conversion, so Sunday was sufficient.

Sunday morning, we all woke up to 10 inches of snow. Still more was falling. The convertee staff member was stuck, we were stuck and the conversion was stuck — called off for another weekend.

Overlapping records

Everything looked good for the conversion I call the "Multiple Master Mix-up." The tape files were delivered on time from the servicer. They were the correct files and were submitted with copies. The master tape file was composed of two tapes (Tape 1 and Tape 2). All the other tape files were one-tape files. The only thing that seemed odd was that the copies were not distinguishable from the originals because they were not marked as such.

After sorting out the tapes, which came in one large package, we fired up the conversion. At the point in the conversion where totals required reconciling, the conversion figures were over by about 50 accounts and $50,000 in balance. Closer inspection revealed that the miscalculation was confined to one branch, a point on the master file that fell about where the second tape began.

There was no doubt in anyone's mind that the conversion programming was correct. Then, what happened? Did the convertee's computer I/O software glitch at the end of the first master tape, processing records left over in memory? Did the servicer's computer glitch at the end of tape routine, writing out records left over in memory?

After about three hours of five minds pondering the problem, someone raised a question, and the realization struck us all simultaneously. "What if Tape 1 of Copy 1 was used, followed by Tape 2 of Copy 2?" Inasmuch as the copies were not marked, how could we know if it did or did not happen?

Of course, that was it! Reels of 2,400 feet in length do not hold exactly the same amount of data. It depends upon how much cutting was done during their lifetimes and where the reflective spots were placed. In this case, the conclusion was that one tape was from Copy 1 and the other from Copy 2, leading to an overlap of records.

Hence, the surplus in the conversion figures could be found in duplicated records on the converted file — easy to eliminate in the next conversion program, which sorts and drops duplicates accompanied by console messages. This is just what happened! The 50 duplicate accounts were dropped, and the converted file was back in shape.

Later, we realized that with the two-tape file plus the copies, random selection of Tape 1 and Tape 2 combinations allowed two chances to be correct, one chance to be over and one chance to be under. God forbid we were under! We might never have reached the conclusion that we did and might still be hunting for the 50 accounts to this day. ■

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NEW PRODUCTS

Hyperdrive upgrades out for Mac Plus

General Computer Corp. of Cambridge, Mass., has introduced versions of its Hyperdrive and Hyperdrive 20 internal hard disk drives, said to be compatible with the Apple Computer, Inc. Macintosh Plus and the standard 512K-byte Macintosh personal computers.

The company has also announced three separate upgrade programs for the company's line of Hyperdrive products. The upgrade packages will allow Macintosh owners to upgrade from a Macintosh 512K to a Macintosh Plus, from a Hyperdrive to a Hyperdrive 20 and from a Hyperdrive or Hyperdrive 20 to a Hyperdrive 2000.

Two packages are available for upgrading Macintosh 512K computers to Macintosh Plus computers. Hyperdrive owners who install one of Apple's 800K-byte disk drives can purchase, for $89, a General Computer upgrade package that includes new system software and Hyperdrive read-only memory (ROM), a drive bracket and cable and a new users' manual. Macintosh owners who replace the logic board in their computers can purchase a $299 upgrade that includes the same components as well as the Hyperdrive controller board.

The Hyperdrive to Hyperdrive 20 upgrade package costs $895. It includes a 20M-byte drive, a drive bracket and cable, new system software and a Hyperdrive 20 manual. It will provide compatibility with Apple's 800K-byte floppy disk drive and Macintosh Plus 128K-byte ROM.

The Hyperdrive 2000 is a coprocessor board and hard disk drive said to give the Macintosh a supplementary 12-MHz Motorola, Inc. 68000 microprocessor. It provides 1.5M bytes of random-access memory, a floating-point Motorola 68881 coprocessor and a 20M-byte internal hard disk drive. The Hyperdrive 2000 upgrade package costs $1,899.

For the Macintosh 512K and the Macintosh Plus, the 10M-byte Hyperdrive internal hard disk drive is priced at $1,399, and the 20M byte Hyperdrive 20 costs $1,699. The Hyperdrive 2000 costs $3,199.

Paradyne unveils modems, packet-switching products

Paradyne Corp. of Largo, Fla., showed a varied offering of communications products at the Interface '86 trade show in Atlanta last month. Products introduced ranged from modems and multiplexers to network management software.

Paradyne has expanded its two major modem product lines with the Challenger V.33/16K and the VHS 14.4 V.33 Trellis-coded, CCITT V.33 modems. Both offer high-speed transmission over four-wire leased lines for applications such as file transfer, backbone interconnect links, private and public packet-switching networks, statistical multiplexer and line-sharing device applications.

Paradyne's Challenger V.33/16K modem is a single-card application.

The Challenger V.33/16K is a full-featured single-card solution for full- or half-duplex data transmission with transparent forward error correction. It offers CCITT V.33 compatibility at 14.4K and 12K bit/sec. as well as a 16K bit/sec. data rate for applications where a greater bandwidth is desired. It costs $3,750.

The VHS 14.4 V.33 adds Paradyne's Analysis network management system to the features of the Challenger V.33/16K. It supports single- and multilevel network architectures with multipoint and switched-network tail circuits. It is priced at $7,650.

Paradyne also introduced the Challenger 19200, a 19.2K bit/sec. Trellis-coded modem. It was designed for full-duplex, point-to-point, leased-line applications. According to the vendor, it provides throughput over D-1 conditioned leased lines using either terrestrial or satellite communications links. It is priced at $4,450 for the stand-alone version and $4,050 for the nest mount version.

Paradyne's 3200 series of digital products includes the 3201 T1 Channel Service Unit (CSU) and the 3210 T1 multiplexer. The 3201 CSU offers built-in bit error test, bipolar violation detector and loopback code generator. It is compatible with an AT&T Digital Access Cross Connect Switch. The 3201 costs $2,275, and the 3210 ranges from $10,000 to $30,000.

The 2030 statistical time division multiplexer was designed for point-to-point or multipoint applications. The four- or eight-channel multiplexer provides channel and link speeds up to 19.2K bit/sec. with aggregate channel inputs of 76.8K bit/sec. It costs $1,500.

Paradyne has also introduced the FDX IBM Personal Computer modem cards for full-duplex asynchronous data transmission at 2,400 or 1,200 bit/sec. One card takes up one full board slot. It is compatible with Hayes Microcomputer Products, Inc. AT commands and Microcom Networking Protocol. The 2,400 bit/sec. card costs $595, and the $1,200 bit/sec. card costs $475.

In addition to modems and multiplexers, Paradyne introduced the PDN 5200 family of packet-switching products. It includes products said to meet low as well as high data volume applications.

The family includes three models: the PDN 522X.25 Micro Node stand-alone multifunction network element, the PDN 5202-02 Compact PSX designed for medium data volume private X.25 network applications and the PDN 5202 Standard PSX. Starting prices range from $5,520 for the Micro Node to $75,000 for the PDN 5202 Standard PSX.

Analysis Entre is a software package Paradyne has introduced to extend network management capabilities. Operating on Paradyne's PDX Messenger Workstation or on an IBM Personal Computer, it is compatible with modem speeds ranging from 2,400 to 19.2K bit/sec. Analysis Entre is priced at $1,195.

INSIDE

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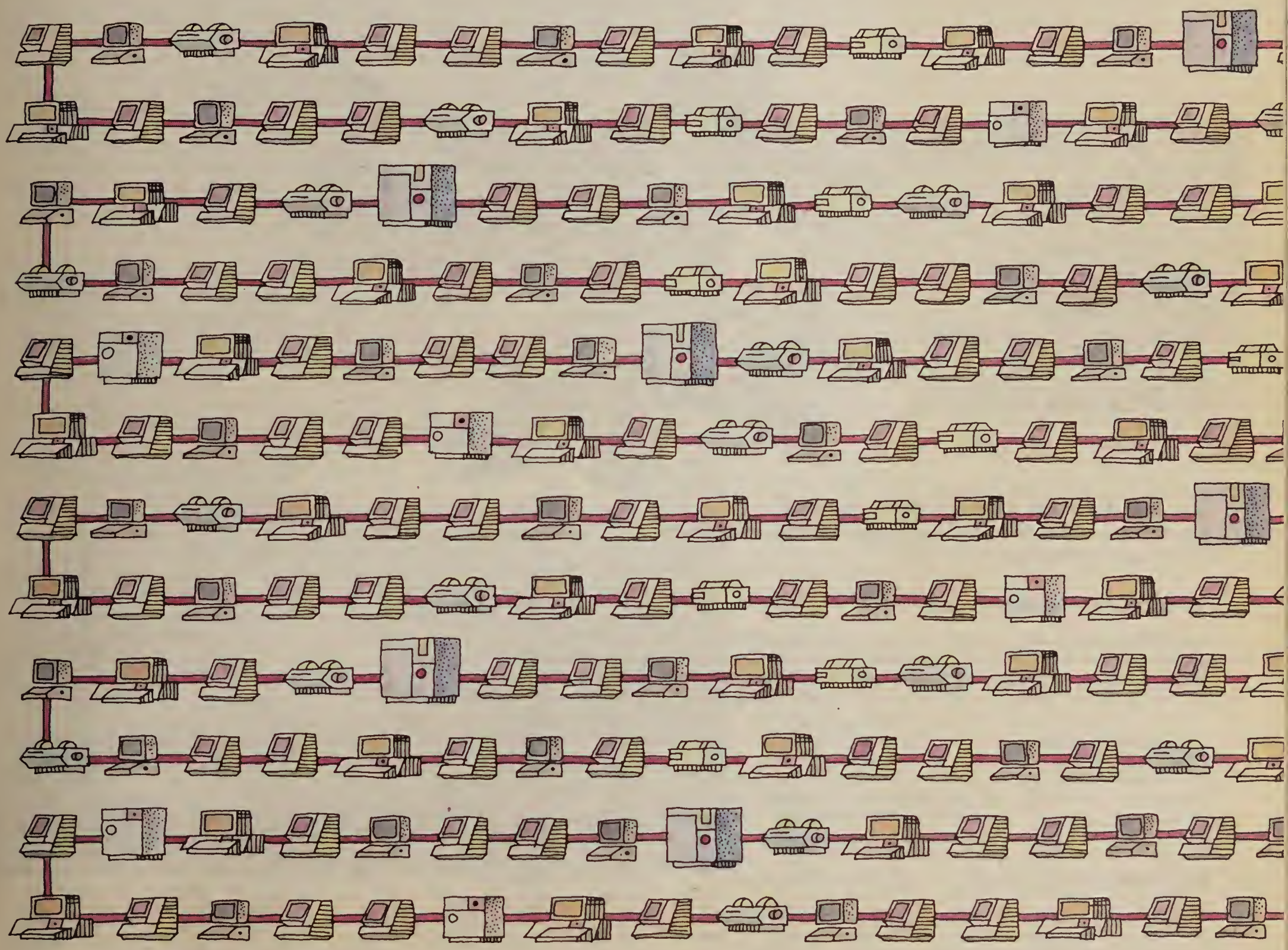

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SOFTWARE & SERVICES

Systems software

Pinnacle Systems, Inc. has ported a fully implemented version of the AT&T Unix System V operating system to the **Pinnacle XL.**

Pinnacle's implementation of Unix System V includes a proprietary memory management unit architecture said to allow optimum multiuser memory efficiency, the structured separation of low-level I/O tasks from operating system functions and an enhanced version of the Unix System V serial I/O routines.

The Pinnacle XL supporting Unix System V is priced from $12,000.

Pinnacle Systems, 10355 Brockwood Road, Dallas, Texas 75238.

■

Control Data Corp. has announced that Power Technologies, Inc.'s **Power System Simulator** (PSS/E) software is now available on CDC's Cyber 180 computer system.

PSS/E is a power system planning software package for the electric utilities industry. Applications include load flow, fault analysis, dynamic simulation, network reduction, transfer limit analysis and Eigen value and frequency response analysis.

The Cyber 180 implementation is said to handle the program's full 12,000-bus problem size capacity along with its full CRT and hardcopy graphics capabilities.

Licenses range from $100,000 to $150,000.

CDC, 8100 34th Ave. S., Minneapolis, Minn. 55440.

Honeywell, Inc. has announced **Graph 6**, a centralized interactive business graphics and program development capability for its DPS 6 small systems.

Graph 6 is said to allow Honeywell and IBM personal computer users to create bar charts, pie charts and more by using data stored in DPS 6 files or entered locally. The program development facility allows graphics to be incorporated into user applications written in either Cobol or C.

DPS 6-based modules and their starting license fees are, for the Graph 6 Executive, $220; for the Graph 6 Interactive Facility, $330; and the Graph 6 Application Development Facility, $825. The PC-based software modules are the Graph 6 Workstation Facility workstation, which costs $595, and the Graph 6 Device Controller Facility workstation, which costs $495. The DPS 6 software is priced at $1,375.

Honeywell, 300 Concord Road, Billerica, Mass. 01821.

■

Menlo Business Systems, Inc. has announced **Foundation**, an application development and maintenance productivity package for use with Tandem Computers, Inc. Pathway.

Foundation combines application software and a methodology. The software provides application-level security, user-customized menus and task routing, on-line Help features and utilitarian data bases. Model programs and a methods and procedures manual provide support for application planning and development.

Foundation costs $26,000, including source code.

Menlo Business Systems, 334 State St., Los Altos, Calif. 94022.

Application packages

Gary Brown Associates, Inc. has announced its **1986 Fixed Assets Management System/On-Line** (FAMS/OL) for the IBM System/38.

FAMS/OL is said to be a tool for assets accounting and property reporting. Features include new 19-year real property and luxury car regulations; on-line tax reference guide; information for forms 3468, 4255, 4562 and 4797; 19 reports; the ability to consolidate divisions within each company; the ability to suppress details on all reports; user defined increments for the automatic numbering of assets and on-line Help.

FAMS/OL costs $6,800.

Gary Brown Associates, 322-B Edwardia Drive, Greensboro, N.C. 27409.

■

McDonnell Douglas Computer Systems Co. has announced **Insci 90**, a human resource management system designed to run on its relational data base management minicomputers.

Insci 90, developed by Information Science, Inc., is said to permit employee tracking from resume to retirement. It offers multiple levels of security and provides human management functions, including employment, compensation, benefits, manpower planning and career development.

Insci 90 operates on systems using Microdata Corp.'s Reality operating system.

Continued on page 96

From J.D. Edwards & Company, the industry specialist for IBM System/36 and System/38 computers, comes award-winning software.

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Some of the features noted are available only for the IBM S/38.

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Languages

Transportable Software International, Inc. has introduced **Transportable Business Language** (TBL), a compiler and runtime program.

TBL is said to enable programs written in Datapoint Corp.'s DOS and RMS Databus language to be executable on non-Datapoint computers.

The compiler enables existing Datapoint programmers to continue development and maintain systems in Databus. The runtime system makes the host appear as a Datapoint machine to the user.

Versions are available for systems ranging from Data General Corp. MV series to IBM PC-DOS or Microsoft Corp. MS-DOS systems. Prices range from $2,400 to $32,000.

Transportable Software International, 140 Sylvan Ave., Englewood Cliffs, N.J. 07632.

Utilities

VM Systems Group, Inc. has introduced **V/Copy**, a replacement for commonly used functions of the CMS COPYFILE command for the VM operating system for IBM and compatible mainframes.

V/Copy is said to offer reduction of CPU and I/O resources required for common forms of CMS file copy operation, simplification of common or difficult copy operations and encryption and decryption of the contents of a file.

Prices start at $3,395 for a single-processor, three-year license.

VM Systems Group, 901 S. Highland St., Arlington, Va. 22204.

■

Programart has announced **Release 7.2** of the **Strobe** application tuning product for IBM and compatible mainframe sites.

The new release includes improvements in the optional IMS feature as well as logic that enables Strobe users to work with Pansophic Systems, Inc.'s Panexec and with IBM's Development Management System and Interactive System Productivity Feature.

Other features include an expanded reporting of I/O resource utilization by VSAM data sets, the reporting of activity in the MVS/XA nucleus by names of internal modules and the enhancement of indexers to support recent releases of compilers for Cobol, Fortran and PL/I.

Strobe is priced at $15,500 for MVS and $9,500 for VSE.

Programart, 30 Brattle St., Cambridge, Mass. 02138.

Training software

Individual Software Corp. has announced **Individual Training for Lotus 1-2-3 Release 2**, a tutorial for users of Lotus Development Corp.'s 1-2-3.

The tutorial is said to cover everything from work sheet operations through macros and functions. It is self-paced and provides sample work sheets and simulations.

The program requires an IBM Personal Computer, Personal Computer XT, AT or compatible with 128K bytes of memory. It costs $69.95.

Individual Software, 1163-I Chess Drive, Foster City, Calif. 94404.

Services

Dean Lem Associates, Inc. has introduced ***Type Processing***, a book intended to provide instructions on how to use a microcomputer for keyboarding text copy that will be typeset by a typesetting service.

Type Processing is a basic text, workbook and reference guide of typographic fundamentals and usage, and it includes a command code language. It presents a step-by-step method for making it possible to use text copy from floppy disks as input to a typesetting system. Text can be input by direct entry or via a telephone and modem.

Type Processing costs $39.50.

Dean Lem Associates, Suite C, 1526 Pontius Ave., Los Angeles, Calif. 90025.

MICROS

Systems

Talbott Corp. has introduced the **Comet PC/AT** and the **Comet PC/XT** personal computers.

The Comet AT features a 16/24-bit, 6 MHz Intel Corp. 80286 CPU, 640K bytes of random-access memory (RAM) expandable to 3M

Continued on page 100

Introducing the TI 880 AT Printer. Because you need a multi-user printer that works overtime.

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The printer that works overtime.

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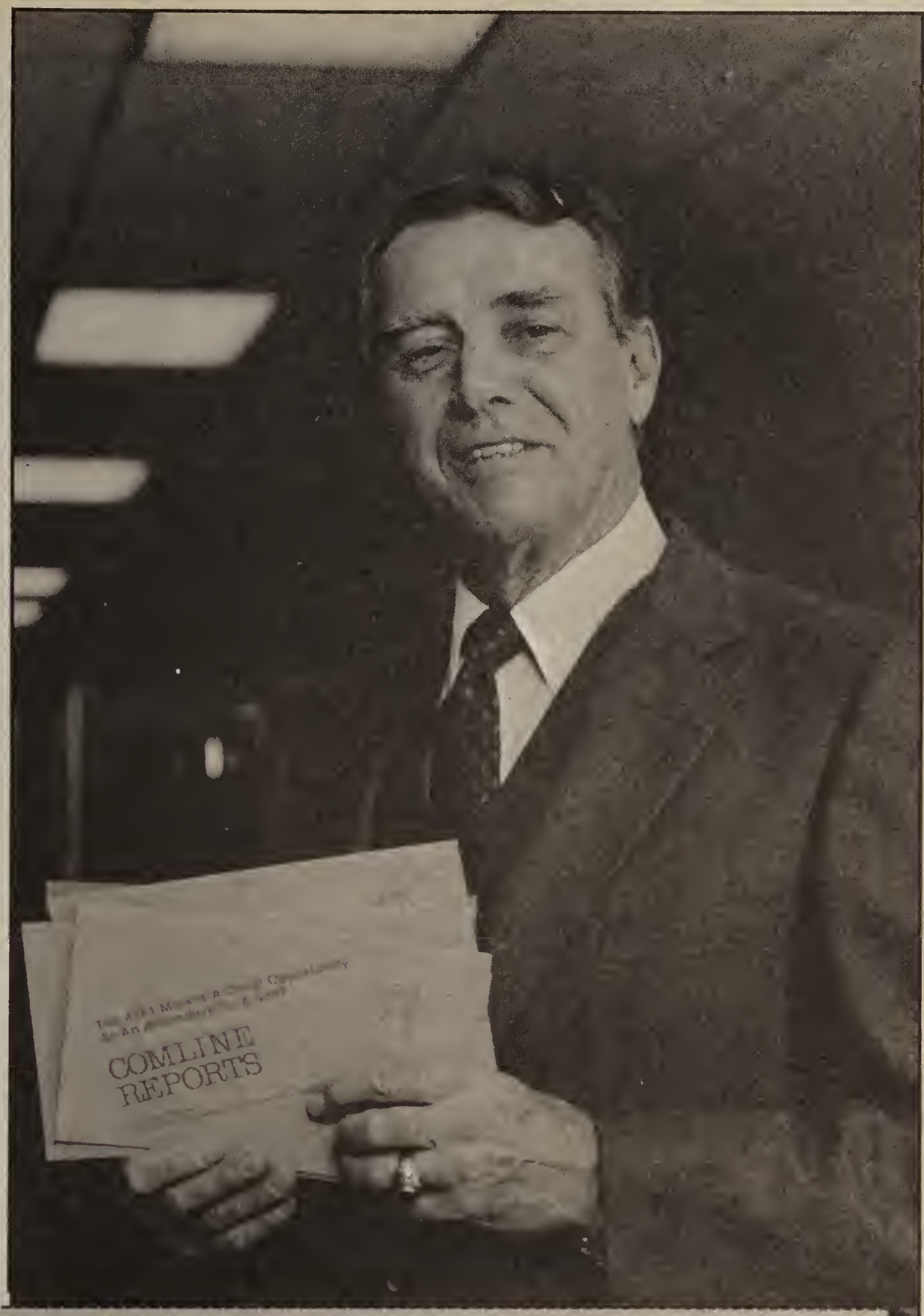

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  Mip for mip, you'll discover why a used 4341 can be your best buy as an alternative to a 4381.
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  Will the real 3090 please stand up? (Future Issue)

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Cullinet's line of applications software delivers leading edge functionality in all areas. Our advanced manufacturing system is designed to provide multi-plant production and inventory control. Our integrated financial solutions assist in effectively managing all your financial activities. Our human resource management system integrates all your payroll and personnel functions into a single system. And our banking solution combines all major banking functions to provide comprehensive relationship banking capabilities. Each application is designed by industry professionals with a thorough understanding of your business requirements.

Because Cullinet's Information Center Management System provides Consistent and Simple Access to all Corporate Information...

...your managers can make effective business decisions based upon complete information. Your information residing on the mainframe, departmental minicomputer or information from personal computers such as documents, spreadsheets and graphs can be consolidated to provide a composite view of all your corporate activities. Cullinet's unique integration delivers the tools you need to create a complete corporate information system.

For example, for the manufacturer with the need to associate production data with sales orders and forecasts, or skills requirements with shop floor needs, or for the bank associating customer information with loan data, Cullinet's micro to mainframe integration allows you to deliver the appropriate data to a personal computer for analysis so that your managers can make effective business decisions for your company.

Only Cullinet's Complete Corporate Information Solution is based on Three-Level Integration...

...resulting in a comprehensive information system that delivers the tools you need to address today's critical business requirements, make decisions on the latest information and respond to the challenging environment of today and tomorrow. Only through the complete integration of **applications, information center** and **database** can you gain a lasting competitive advantage.

For more information about the only corporate information strategy for the '80's and '90's, call Cullinet's toll-free number 1-800-551-4555.

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 96

bytes, a 1.2M-byte floppy disk drive, eight IBM-compatible expansion slots, Microsoft Corp. MS-DOS and IBM PC-DOS compatibility and 192W power supply.

The Comet XT features a 16-bit, 4.77 MHz Intel 8088 microprocessor, 640K bytes of RAM, MS-DOS and PC-DOS and eight expansion slots. It also features a 360K-byte floppy disk drive and a 135W power supply.

The Comet AT costs $2,995, and the Comet XT costs $1,295.

Talbott, Suite 7, 2545 Chandler Ave., Las Vegas, Nev. 89120.

Software applications packages

Brainware Enterprises has announced **Sequential and Random Access Thinking** (SARAT) project planning and idea organizing software.

According to the vendor, SARAT allows organized and meaningful brainstorming of idea and thoughts. It offers continual reassessment of all user input. A sample project is shown during the running of SARAT.

SARAT is available for the IBM Personal Computer and for the Commodore Business Machines, Inc.'s Commodore 64 and 128.

SARAT costs $59.95 for the IBM version and $39.95 for the Commodore version.

Brainware Enterprises, 4943 Newton Ave. N., Minneapolis, Minn. 55430.

■

Integrated Software Design, Inc. has announced a **graphics label editor module** for use with its Generalized Barcode and Labeling software package.

The graphics label editor is said to allow users to design labels on the screen. The label may be test-printed at any time.

The graphics label editor module requires either Generalized Barcode and Labeling software or the Chemical Industry Barcode and Labeling software package to be present on an IBM Personal Computer XT with a minimum of 320K bytes of main memory, one 10M-byte hard disk, one floppy disk drive and an IBM color card and monitor.

The module costs $195.

Integrated Software Design, 84 Copeland Drive, Mansfield, Mass. 02048.

■

Design Computation, Inc. has announced **Draftsman-EE**, a schematic graphics editor; **DC/Autorouter**, a multilayer printed-circuit board autorouter; and **DC/Netlist**, a netlist generator for use with Draftsman-EE.

Draftsman-EE allows users to create and edit design schematics and to create and maintain a customized parts library. It can be used as a layout editor or to modify printed-circuit board routes generated by DC/Autorouter. DC/Autorouter features hugging and break-point restarting. Its output files can be edited with Draftsman-EE. DC/Netlist creates an immediate net list for each schematics page.

Draftsman-EE costs $749. DC/Autorouter costs $2,498, and DC/Netlist costs $295.

Design Computation, 10 Frederick Ave., Neptune, N.J. 07753.

■

Simplesoft Products, Inc. has announced **It Figures**, an electronics work sheet for IBM Personal Computers and compatibles.

The program is said to combine a programmable calculator with the column and line format of spreadsheet programs. It allows users to design work sheets for solving mathematical problems using a preformatted three-col., 20-line design.

Features include line and screen editing, access to on-screen Help lines and menus, the ability to define local and global variables and preprogrammed scientific exponential notation and trigonometric functions.

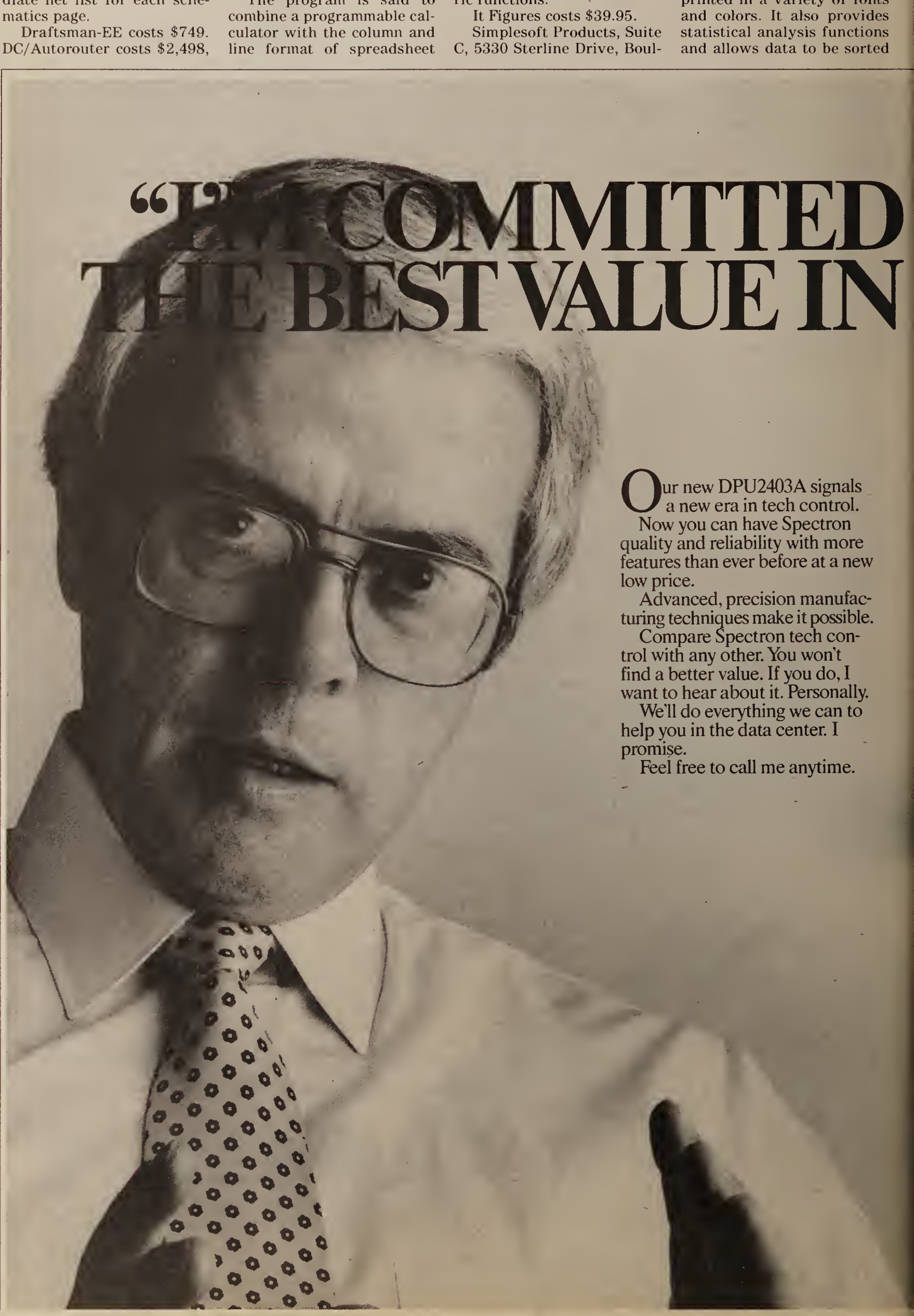
It Figures costs $39.95.

Simplesoft Products, Suite C, 5330 Sterline Drive, Boulder, Colo. 80301.

■

Advanced Technology Center has announced **Plotit**, a Graphics Kernal System-based interactive graphics and statistical application package.

Plotit is said to provide 35 basic graph types that can be printed in a variety of fonts and colors. It also provides statistical analysis functions and allows data to be sorted



NEW PRODUCTS/MICROCOMPUTERS

or transformed mathematically. It provides its own graph and data storage facility.

Plotit features a built-in Fortran interpreter.

The Digital Equipment Corp. VAX-11/780 version costs $6,500, and the IBM Personal Computer version is priced at $550, according to the vendor.

Advanced Technology Center, Suite 238, 5711 Slauson Ave., Culver City, Calif. 90230.

Levien Instrument Co. has introduced **Byso Print**, a typographic software package for the IBM Personal Computer.

According to the vendor, Byso Print delivers camera-ready type with a dot matrix printer. It can achieve 360 by 360 dot/in. resolution on 24-pin dot matrix printers. It offers 79 digitized typefaces, and each face can be set in sizes up to 3 in. tall.

Copy is entered on any word processor or text editor. Five application formats are included, and Byso Print can be used with other software packages, such as Lotus Development Corp.'s 1-2-3.

A single-user license costs $500.

Levien Instrument, P.O. Box 31, Sitlington Hill, McDowell, Va. 24458.

■

Kern International, Inc. has introduced **QCCP**, a quality control chart program for Apple Computer, Inc. or IBM Personal Computers.

QCCP automatically plots average and range charts side by side, thus minimizing errors. Process data is input through the personal computer keyboard. Data files may be stored on disk, recalled, modified and plotted.

The QCCP package consists of a user manual that contains a review of the underlying theory, operating instructions and case studies. The program disk contains the source code in Basic.

QCCP costs $95.

Kern International, Department Q1, 575 Washington St., Pembroke, Mass. 02359.

■

Shade Information Systems, Inc. has announced **Wisard**, a forecasting system for IBM Personal Computers and the Hewlett-Packard Co. HP 150.

According to the vendor, Wisard can produce forecasts with as few as six actual values, produce forecasts when a time series includes intermittent zero values, accept data from one of five time periods, determine seasonal factors automatically and use trading days to adjust for holidays and sales promotions.

Other features include full screen data entry, character plot graphics or line graphics and the ability to exchange data with Lotus Development Corp. 1-2-3.

Wisard is priced at $495.

Shade Information Systems, P.O. Box 19730, Green Bay, Wis. 54370.

■

Bank of America has added the **Term Debt Manager** to its Microstar treasury management service designed to manage and analyze corporate international and domestic debt.

The product is said to handle syndicated loans, Eurobonds and domestic bonds, loans denominated in foreign currencies, commercial paper and fixed and floating rate debt. It provides increasing and decreasing availability and reduction schedules, projection reports and records of terms and conditions for each facility.

Term Debt Manager runs on the IBM Personal Computer, Personal Computer XT, AT and Compaq Computer Corp. Compaq Plus. It costs $8,500.

Bank of America, Bank of America Center, 555 California St., San Francisco, Calif. 94104.

■

Bass Institute, Inc. has announced **Bass Base Product**, a data management and statistical package for the IBM Personal Computer and compatibles.

Bass was designed to handle a maximum of 4,096 variables and 32,767 observations. Variable names can be up to 16 char. long. True arrays, dynamic variables and a data management language are supported.

Procedures are included for descriptive statistics, plotting, printing, charting and regressions of data.

The product costs $95.

Bass Institute, P.O. Box 349, Chapel Hill, N.C. 27514.

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Doug Leger
General Manager, Spectron

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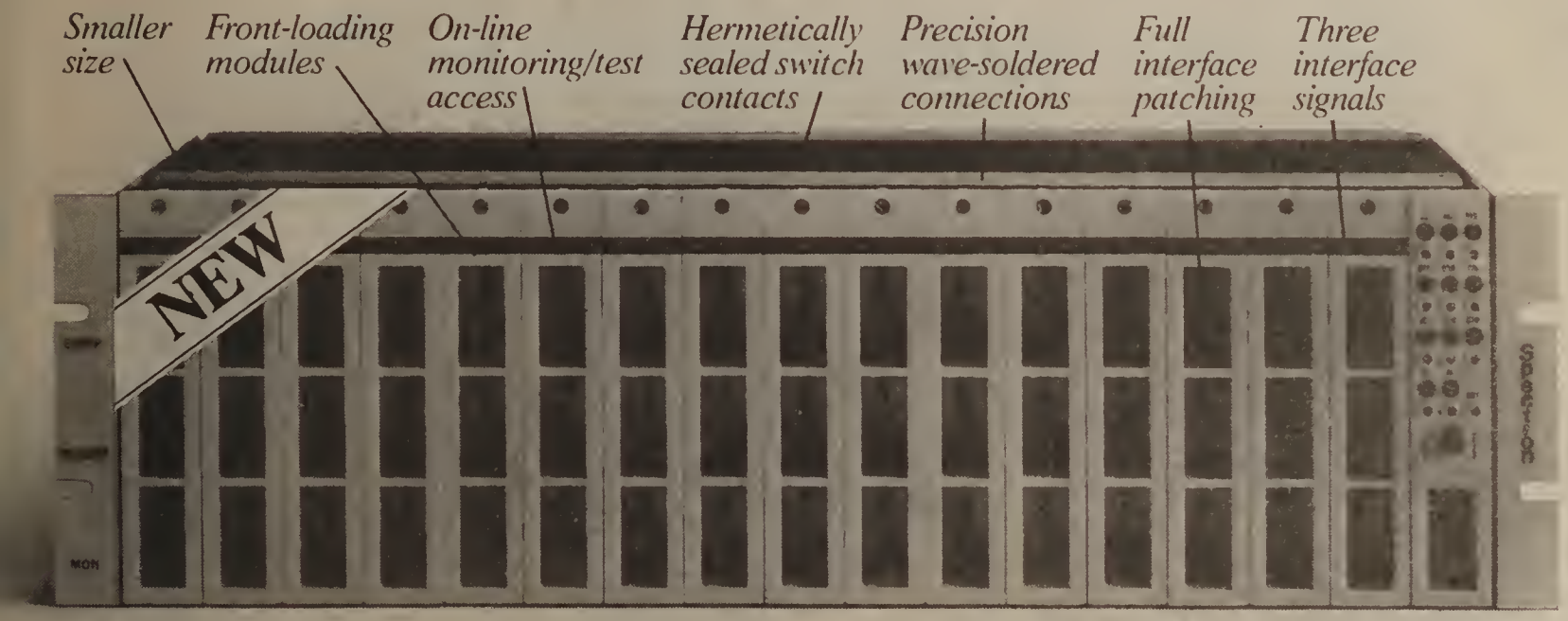

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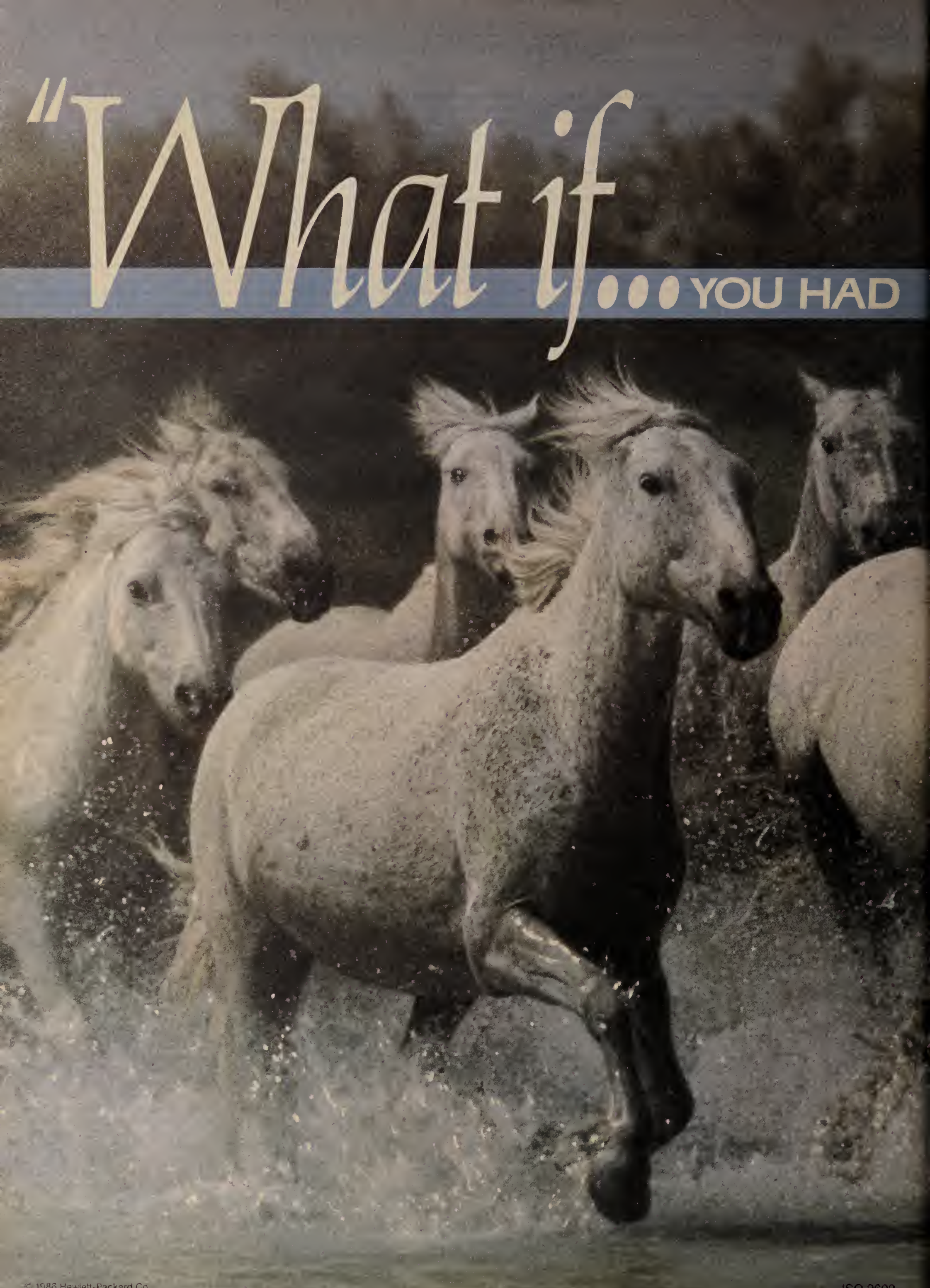

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The new HP 3000 Series 930 is a new breed of business computer. While it's a full member of the HP 3000 family, it has more brute power and performance than any HP 3000 we've ever built. It's designed around a new breakthrough architecture. But most importantly, it's the latest example of Hewlett-Packard's commitment to providing solutions for the long run.

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Now you can have a 4.5 MIPS computer that can address a space 64,000 times larger than a typical 32-bit machine. A computer that can handle hundreds of on-line users and large batch processing jobs at the same time. In fact, you can link Series 930 systems to create a network for thousands of users.

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The performance of the HP 3000 Series 930 is achieved through a synergistic use of an enhanced operating system, a new database management system and a new architecture that we call Precision Architecture.

HP Precision Architecture is a fully engineered architecture, based on extensive measurements to evaluate the utility of each feature. We also wanted to keep it simple. The result is a design that exploits the CPU price/performance advantages of R.I.S.C. (Reduced Instruction Set Computing), while adding an unprecedented level of execution balance. A balance that maximizes throughput and efficiency while maintaining compatibility with our current products. In fact, the performance levels have been so dramatic that a new generation of HP computers is being built around HP Precision Architecture.

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Since the HP 3000 Series 930 is part of a family, it's compatible with existing HP 3000's. And HP Precision Architecture assures compatibility with the new, more powerful HP computers to come. Because we don't believe in temporary solutions.

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Business Computing Systems

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Lil'Net solves the same problems another minicomputer or a LAN solves. And solves these problems far more economically.

As an intelligent data switch, Lil'Net serves as the hub for your network. Rather than dedicating specific terminals to specific ports, this remarkable little system makes devices available on demand. This universal access lets you maximize your current computer resources. You can even expand all the way up to 512 different lines.

Lil'Net also provides powerful network management tools. Advanced security. And surprising ease of operation.

Lil'Net shares many of the same performance characteristics as Develnet—the world's first truly distributed data networking product, that's helping improve the net worth of companies like Hughes Aircraft, General Electric, State University of New York in Buffalo and NASA.

Given all of Lil'Net's big features, you could say all of our hard work last winter really paid off. To find out just how well, call our toll-free number:

1-800-667-3740

Or write to:

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Canada

Lil'Net may be hard to top.
But we've got all this winter to try.

Develcon

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NEW PRODUCTS/MICROCOMPUTERS

Data Transforms, Inc. has announced **Printrix**, a personal typesetting software package designed for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

Printrix is said to accept text files created by standard word processors — such as Micropro International Corp. Wordstar, Satellite Software International Wordperfect and Microsoft Corp. Word — and add fonts, page formatting and graphics to produce camera-ready typesetting on dot matrix and laser printers. Printrix also accepts ASCII text files and binary graphics files from other programs.

Printrix is priced at $120.

Data Transforms, 616 Washington St., Denver, Colo. 80203.

■

SIL, Inc. has announced the **CICS Expert**, an expert system knowledge base for CICS programmers.

The CICS Expert is said to offer design considerations, problem determination and CICS facilities such as BMS, TDQ, VSAM File, DL/1, interface, task control and temporary storage, among others.

CICS Expert runs on the IBM Personal Computer XT, AT and compatibles. It is priced at $95.

SIL, 1593 Locust Ave., Bohemia, N.Y. 11716.

■

Avery International's Business Systems Division has introduced **List & Mail**, a line of personal computer software and supplies designed for IBM Personal Computer users with mailing list management needs.

The software is menu driven and is said to sort by any field. It features list building, list updating and format options for list printing.

List & Mail costs $59.95.

Avery International's Business Systems Division, 777 E. Foothill Blvd., Azusa, Calif. 91702.

■

Mathcad, Inc., a computer-aided mathematics software program, has debuted from **Mathsoft**.

Mathcad is said to allow a personal computer to be used as a scratch pad. According to the vendor, equations can be entered and calculated, plots can be created and text can be entered and edited on the same screen. It reportedly presents equations correctly on the screen automatically, sizing brackets and fraction bars.

Matchcad costs $189.

Matchsoft, One Kendall Sq., Cambridge, Mass. 02139.

■

Lattice, Inc. has introduced **Logistix**, an integrated software package said to combine time management, data base, spreadsheet and graphics functions into one work sheet.

According to a company spokesman, Logistix gives users the ability to store, analyze, manipulate and present time elements as well as numerical and statistical information.

The work sheet measures 2,048 rows by 1,024 col. It provides color support formatting options, Help, special function keys, automatic support of an Intel Corp. 8087 coprocessor and user-defined macros.

Logistix runs on the IBM Personal Computer, Personal Computer XT and AT. It costs $450.

Lattice, P.O. Box 3072, Glen Ellyn, Ill. 60138.

Vocam Systems, Inc. has announced **Shiptracr**, a transportation management system designed for the IBM Personal Computer XT or compatibles.

Shiptracr is said to provide tracking and management for shipments; analysis for consolidation planning; supporting data for effective rate and service negotiations with carriers; calculation of savings between actual and alternative transportation methods; and cost apportioning.

Shiptracr costs $1,500.

Vocam Systems, 10800 Lyndale Ave. S., Blookington, N.M. 55420.

■

Media Cybernetics, Inc. has announced **Image-Pro 1000**, a graphics software system for the IBM Personal Computer AT and compatibles.

The Image-Pro 1000 system was designed for use with 1,024- by 1,024-pixel graphics boards. It is said to provide imaging functions such as spatial filtering, edge detection, contrast enhancement, morphological processing, scaling, image averaging and real-time pan and zoom. Advanced measurement functions include distribution, contour, color and frequency domain analysis.

The software costs $2,000. A complete 1K-byte by 1K-byte image processing add-on subsystem for the AT costs $14,500.

Media Cybernetics, Suite 200, 8484 Georgia Ave., Silver Spring, Md. 20910.

■

Computone Systems, Inc. has announced the **Office Atvantage**, a desktop organizer for multiuser Microsoft Corp. Xenix systems.

According to the vendor, users can define data bases and paint windows in any layout. Data may be shared among users.

The Office Atvantage is available for the IBM Personal Computer AT and compatibles running Santa Cruz Operation, Inc. System V or IBM System 3 Xenix. It costs $299.

Computone Systems, Suite 200, 1 Dunwoody Park, Atlanta, Ga. 30338.

■

Burroughs Corp. has announced **Microview**, a decision support software product designed to help users access mainframe-managed data and manipulate it on a local micro.

Users can selectively transfer data managed on a Burroughs A series mainframe to Burroughs B25 family of micros and XE 520 minicomputers.

Microview costs from $600 to $1,200.

Burroughs, One Burroughs Place, Detroit, Mich. 48232.

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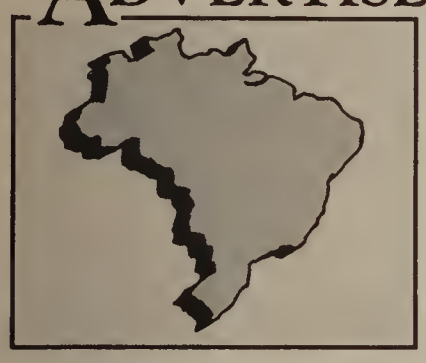

Brazil has the largest computer market in Latin America. According to data compiled by *Computerworld Brazil*, data processing expenditures for 1984 were valued at $1.3 billion (U.S.). Sales of MIS/DP equipment and services are forecast to reach $6.62 billion by 1989.

CW Communications has three publications covering the Brazilian market; *DataNews, Micro Mundo* and *PC Mundo.*

DataNews is a weekly newspaper for over 12,000 computer professionals and computer industry executives. *Micro Mundo* is a monthly magazine for over 30,000 personal computer users. And *PC Mundo*, a magazine for IBM PC and compatible product end-users, is distributed every other month to *DataNews* and *Micro Mundo* subscribers.

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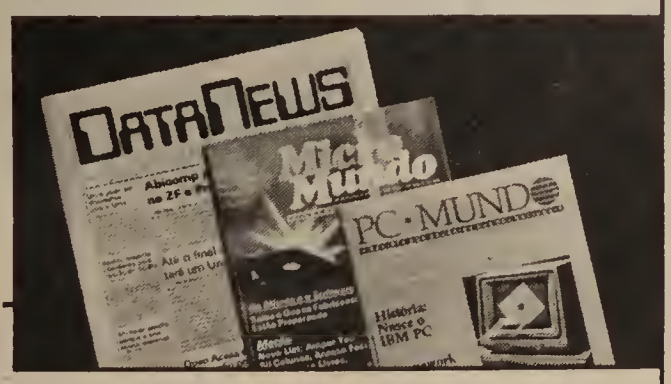

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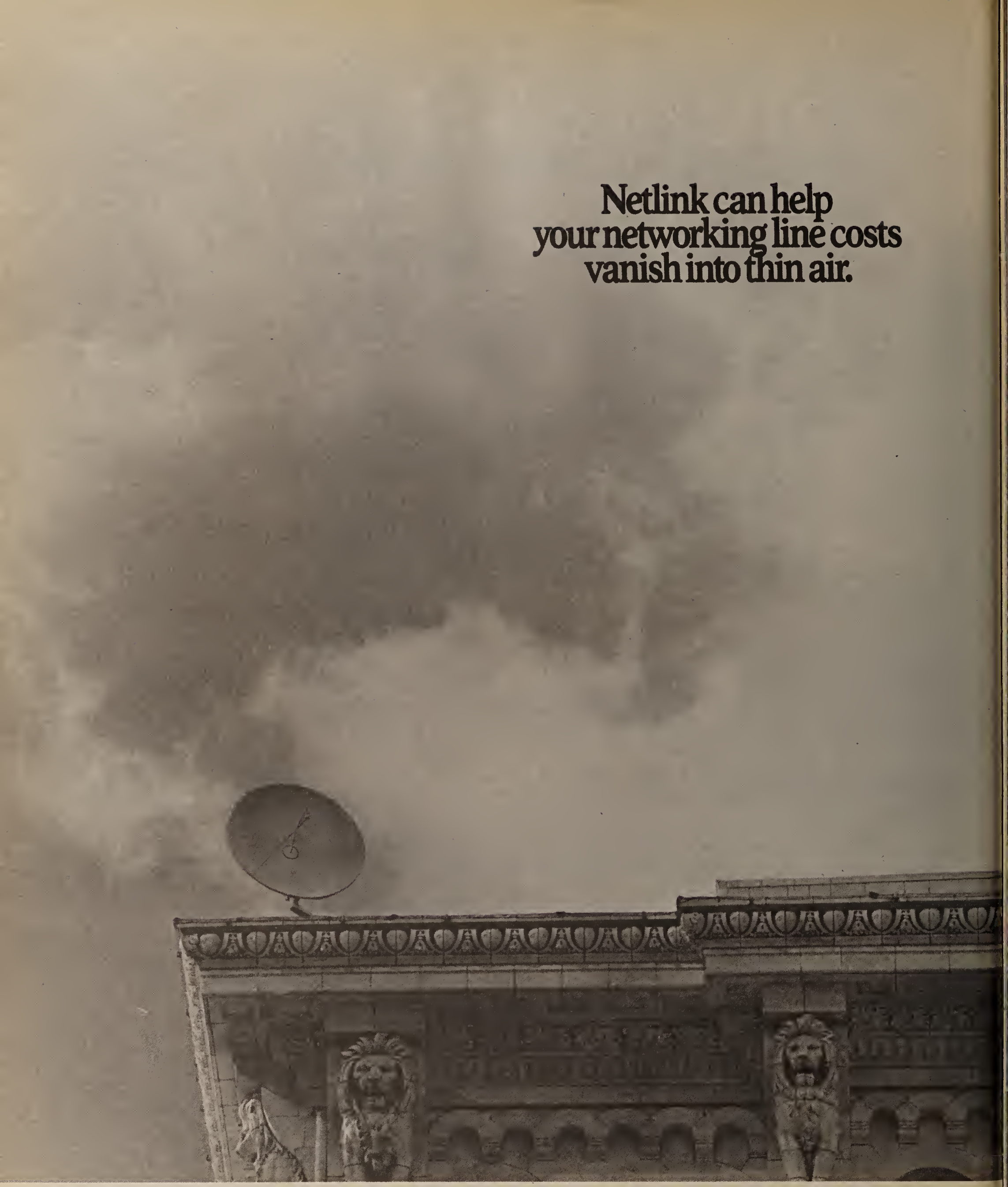

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NEW PRODUCTS/MICROCOMPUTERS

Software languages

Micro Focus has announced **High Performance Level II Cobol/Multi-user** software said to support multiuser applications running under Unix, Concurrent DOS, Microsoft Corp. Xenix and under IBM PC-DOS using Novell, Inc. Netware.

The software offers indexed relative and sequential file support, automatic file sharing and record locking using only ANSI syntax and Micro Focus' Animator debugging tool.

High Performance Level II Cobol/Multi-user prices start at $1,000.

Micro Focus, 2465 E. Bayshore Road, Palo Alto, Calif. 94303.

Software utilities

D. A. Martin has introduced **SPC Orchestra**, a menu-driven template for Lotus Development Corp.'s Symphony.

SPC Orchestra is said to generate statistical process control charts including X bar and R charts, histograms and cumulative sum charts. It also produces a statistical summary showing control limits, process capability indexes and frequency distributions of X bars and of individual points.

SPC Orchestra requires 448K bytes of random-access memory and Symphony software. It costs $95.

D. A. Martin, 6213 High St., Pennsauken, N.J. 08110.

■

California Software Products, Inc. has announced **Backpak**, a utility software package for backing up and restoring hard disk data on IBM Personal Computers.

According to the vendor, Backpak only copies files that are new or have been modified since the last time the data was backed up. Backpak comes with California 10 Pak, a set of utility programs for viewing, browsing, sorting and comparing text files, non-text files and memory.

Backpak costs $175.

California Software Products, 525 N. Cabrillo Park Drive, Santa Ana, Calif. 92701.

■

Infostructures, Inc. has announced **Popdrop**, a memory management utility program for IBM Personal Computers and compatibles.

Popdrop is said to allow users to load and remove random-access memory (RAM)-resident programs without rebooting the system. Other features include the ability to use memory committed to one purpose to serve another and the capability for print spoolers, keyboard enhancers, RAM disks and pop-up programs to come and go as the user needs them.

Popdrop is priced at $19.95.

Infostructures, P.O. Box 32617, Tucson, Ariz. 85751.

■

Intersecting Concepts, Inc. and **The Software Toolworks** have introduced **Media Master Plus**, a program designed to read 8-bit Digital Research, Inc. CP/M software disks on 16-bit Microsoft Corp. MS-DOS computers.

The program is said to allow microcomputer users to read, write and format up to 150 different 5¼-in. CP/M, MS-DOS and IBM PC-DOS operating systems.

Media Master Plus costs $59.95.

Intersecting Concepts, 4573 Heatherglen Court, Moorpark, Calif. 93021.

■

Systems Solutions Associates has introduced **ESP1**, a multitasking utility for IBM Personal Computer AT users.

According to the vendor, ESP1 offers the ability to use extended memory of IBM PC-DOS or Microsoft Corp. MS-DOS programs. ESP1 also supports full-size spreadsheets and data bases as well as high-resolution enhanced graphics programs.

ESP1 costs $169.

Systems Solutions, P.O. Box 8007, Lake Street Station, Minneapolis, Minn. 55408.

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NEW PRODUCTS/MICROCOMPUTERS

Techware has announced **Pangloss**, a word processing software program said to make Micropro International Corp.'s Wordstar a multilingual word processor.

In addition to English, four alphabets are currently available: Arabic, Greek, Hebrew and Russian. All foreign characters are displayed on the screen and printed on dot matrix and daisywheel printers.

According to the vendor, users can create and edit bilingual text with all of Wordstar's features.

The program runs on a range of 8-bit systems including those from Apple Computer, Inc., Kaypro Corp., Osborne Computer Corp.and Televideo Systems, Inc.

Pangloss costs $169.

Techware, P.O. Box 10545, Suite 201, 474 Willamette St., Eugene, Ore. 97440.

Information Reduction Research has announced **Silent Partner**, a random-access memory-resident natural language interface and Help system for word processors.

Silent Partner is said to provide access to the editing functions of Micropro International Corp.'s Wordstar and related software such as Borland International Inc.'s Sidekick and Turbo Pascal.

Silent Partner runs on an IBM Personal Computer, Personal Computer XT or AT. It costs $39.95, plus $5 for postage and handling.

Information Reduction Research, 28 Ridgewood Road, Concord, Mass. 01742.

■

Traveling Software, Inc. has announced **Lapdos** and **TS-DOS**.

Lapdos is said to allow any IBM Personal Computer, Personal Computer XT, AT or compatible to share the Tandy Corp. or Brother International Corp. FB100 portable disk drives used by NEC Corp. and Tandy laptop computers.

TS-DOS is a program said to allow Tandy and Brother FB100 3½-in. portable disk drives to operate with the Tandy and NEC laptops.

Lapdos costs $89.95, including cable adapter. TS-DOS costs $69.95.

Traveling Software, 11050 Fifth Ave. N.E., Seattle, Wash. 98125.

■

Genesis Microsystems Corp. has announced **Genelink**, a linker/locator utility for the IBM family of personal computers.

Genelink is said to allow developers to use Intel Corp.'s development tools and languages to produce IBM PC-DOS programs. Genelink reportedly provides access to compiler-supplied information about types of variables.

Genelink is priced at $395 for the personal computer version and $495 for the version that produces both embedded software and disk-based personal computer software.

Genesis Microsystems, 196 Castro St., Mountain View, Calif. 94041.

■

Q-Soft, Inc. has announced **Symphony File Parser, 1-2-3 Programmers Toolbox** and **Symphony Programmers Toolbox**, three products designed to assist users of Lotus Development Corp.'s 1-2-3 and Symphony in developing applications.

The Symphony File Parser is an add-in said to give the user greater power and flexibility in accessing data from a file on disk while in Symphony. The other two are collections of programming routines and techniques as well as undocumented features of the Lotus programs.

The Symphony File Parser costs $75. The 1-2-3 Programmers Toolbox and the Symphony Programmers Toolbox cost $99 each.

Q-Soft, 22 Polifly Road, Hackensack, N.J. 07601.

Data storage

Everex Systems, Inc. has announced the **Excel-Stream 60-8**, a 60M-byte storage capacity external tape backup system for the IBM Personal Computer, Personal Computer XT, AT and compatibles.

The unit features automatic tape formatting and read-after-write error checking. It has fully configurable direct memory access channels, port addresses and interrupt lines for maximum flexibility and network compatibility.

The Excel-Stream 60-8 costs $995.

Everex Systems, 47777 Warm Springs Blvd., Fremont, Calif. 94539.

■

Peripheral Technology Corp. has announced the **Data Vault Subsystems** for the IBM Personal Computer AT.

The subsystems include mainframe-type Winchester disk drives using the enhanced standard device interface offering formatted capacities of 150M to 320M bytes, a microprocessor-equipped intelligent floppy and hard-disk controller, a 55M-byte ¼-in. streaming tape, Data Vault software offering integrated menu-driven disk and tape management and a custom CPU clock speed enhancing circuit.

Prices start at $6,955 for an internal-mount 150M-byte disk and controller.

Peripheral Technology, 1331 Harlan Lane, Lake Forest, Ill. 60045.

■

Acknowledge, Inc. has announced the **Model AT-4000-I** and the **A-Frame-40** cartridge tape backup systems for IBM Personal Computer XTs, ATs and compatibles.

The products are said to provide 40M bytes of data storage per cartridge and data transfer rates of more than 3M bit/min.

Continued on page 110

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NEW PRODUCTS/MICROCOMPUTERS

Continued from page 108

Model AT-4000-I is an internally mounted unit for use with the PC AT. The A-Frame-40 is an external system that enables users to add a tape peripheral to the IBM PC XT.

The Model AT-4000-I costs $595. The A-Frame-40 costs $950.

Acknowledge, P.O. Box 767, Sudbury, Mass. 01776.

■

Pericomp Corp. has introduced **Data-File**, 20M-byte digital cassettes for use with cassette tape backup drives.

The cassettes reportedly provide a magnetic medium for Winchester backup and other applications.

Prices range from $15 to $8, depending on quantity.

Pericomp, 1 Huron Drive, Natick, Mass. 01760.

Printers/plotters/peripherals

Brother International Corp. has announced the **HR-35** office daisy-wheel printer.

The HR-35 offers two-color as well as bold/shadow printing. It comes with either a Centronics Data Computer Corp. parallel interface or an RS-232C serial interface. It features bidirectional printing at 33 char./sec., a 7K-byte buffer and direct printing capability.

Additional features include auto-underlining, superscript/subscript and a variable impact setting.

The Brother HR-35 costs $1,049. An optional tractor feeder costs $169, and an optional cut-sheet feeder costs $299.

Brother International, 8 Corporate Place, Piscataway, N.J. 08854.

■

Racore Computer Products, Inc. has announced **Drive Two Plus** for the IBM PCjr.

Drive Two Plus is said to add a second disk drive to the PCjr as well as an optional Racore Lanpac interface card and direct memory access.

It enables users to run IBM Personal Computer software on the PCjr.

Drive Two Plus costs $679.

Racore Computer Products, 10 Victor Sq., Scotts Valley, Calif. 95066.

■

Star Micronics, Inc. has introduced the **NX-10** dot matrix printer.

The NX-10 is said to print at 120 char./sec. in draft-quality mode and 30 char./sec. in near-letter-quality mode. According to the vendor, it can emulate the IBM Graphics Printer.

The IBM Personal Computer or compatible can act as the printer's host.

The front panel of the NX-10 displays the print commands. The printer features a rear tractor feed.

The NX-10 costs $349.

Star Micronics, Suite 3510, 200 Park Ave., New York, N.Y. 10166.

■

Terminal Data Corp. has introduced the **Imagescan IS-3000**, an electronic digitizing camera for scanning and converting microfiche images to digital signals at a 300 dot/in. scan format.

The IS-3000 is said to scan, enhance and print images at a rate of 26 page/min. when it is attached to a laser printer.

A standard RS-422 interface for input to an electronic document distribution system is included.

The Imagescan IS-3000 costs $34,950.

Terminal Data, 21221 Oxford St., Woodland Hills, Calif. 92367.

■

Communications Devices, Inc. has announced the **DLM-64**, a device said to enable an ASCII terminal or personal computer to act as a data communications monitor.

According to the vendor, the DLM-64 permits users to perform applications such as communications software debugging, new data terminal checkout and network usage accounting. The unit connects into communications lines via two RS-232 ports and sends characters to the terminal or computer via a third RS-232 port.

The DLM-64 comes with a terminal emulation and recording program for the IBM Personal Computer on a 5¼-in. Microsoft Corp. MS-DOS diskette. It costs $875.

Communications Devices, P.O. Box 28014, Baltimore, Md. 21239.

■

Metheus Corp. has announced the **Omega/PC Graf-07** and **Graf-09** subsystems, said to provide Tektronix, Inc. 4107 and 4109 emulation for the IBM Personal Computer and compatibles.

The subsystems combine the Metheus Omega/PC Display Processor, Metheus 15- or 19-in. color monitors and Grafpoint Tgraf emulation software. They offer 1,024- by 768-pixel resolution, support for 64 windows, surface separation, segments and Tektronix true zoom with pan.

The Omega/PC Graf-07 features a 15-in. monitor and costs $4,950.

The Omega/PC Graf-09 features a 19-in. monitor and is priced at $6,950.

Metheus, 5510 N.E. Elam Young Pkwy., Hillsboro, Ore. 97123.

Board-level devices

Aristo Computers has announced a **640K-byte motherboard upgrade** for the IBM Personal Computer XT and the Compaq Computer Corp. Portable.

According to the vendor, the memory upgrade allows installation of 640K bytes of random-access memory on the system board without using any expansion slots.

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Aristo Computers, Suite 213, 16811 El Camino Real, Houston, Texas 77058.

Services

Visual Horizons has introduced **Computer Slide Express**, a slide generating service for IBM Personal Computer users.

Personal Computer users can convert computerized charts, designs, graphs and graphics to 35mm color slides with 4,000-line resolution. Standard sizes, enlargements, color or black and white prints and overhead transparencies are also available.

The information can be transmitted over telephone lines or mailed to Visual Horizons on a floppy disk.

Each slide costs about $6.50.

Visual Horizons, 180 Metro Park, Rochester, N.Y. 14623.

COMMUNICATIONS

Controllers

Forest Computer, Inc. has introduced **Gateway/1000**, a gateway designed to support bidirectional interactive terminal access between IBM mainframes and Hewlett-Packard Co. HP 3000 computers.

Gateway/1000 provides IBM 3270 terminals the ability to log on to one or more HP 3000 computers and run interactive applications. When accessing the HP 3000, the 3270 emulates HP 2622 terminals. When accessing an IBM mainframe, the HP terminals offer IBM Systems Network Architecture 3270 emulation.

Gateway/1000 hardware and software costs begin at $26,000 and $14,000, respectively.

Forest Computer, 1749 Hamilton Road, Okemos, Mich. 48864.

■

Winterhalter, Inc. has announced the **Datatalker 3270 series**, a family of IBM 3274/3276-emulating cluster controllers that interface IBM and compatible microcomputers with the IBM 3270 network.

The controllers are available in two configurations: the Datatalker PC/8, an add-on IBM Personal Computer bus board that emulates an eight-port 3274/3276 cluster controller; and the Datatalker II, an external box that emulates a three-port IBM 3274/3276 cluster controller.

Both offer IBM 3287 printer support.

Prices range from $1,095 for a single-user system to $2,395 for the eight-user system.

Winterhalter, 3853 Research Park Drive, Ann Arbor, Mich. 48104.

■

Northern Telecom, Inc. has announced an **asynchronous interface line unit** (AILU), a device said to connect RS-232C asynchronous ASCII-compatible terminals to the Meridian SL-1 integrated services network.

The connection is made over standard telephone wiring. The AILU consists of a cable with a male or female RS-232C connector on one end and a standard RS-11 telephone connector on the other. The device permits terminals to be located up to 4,000 feet from the Meridian SL-1 and to communicate at speeds of up to 19.2K bit/sec.

The AILU is priced at $90.

Northern Telecom, 2305 Mission College Blvd., Santa Clara, Calif. 95050.

■

Telebyte Technology, Inc. has announced the **Model TDX-1050 Communicating Tape Controller** said to allow RS-232-based CPUs, private branch exchanges and networks to be attached to a nine-track, ½-in. magnetic tape drive.

The TDX-1050 uses either asynchronous or bisynchronous protocol for bidirectional data transfer. It contains a built-in modem eliminator, operates with single- or dual-density tape drives and requires no software.

Asynchronous rates are 110 to 19.2K bit/sec., and bisynchronous rates are 1,200 to 57.6K bit./sec.

The TDX-1050 costs $2,000.

Telebyte Technology, 270 E. Pulaski Road, Greenlawn, N.Y. 11740.

■

Data Switch Corp. has announced **Masternet 300**, **Controlnet 200** and **Controlnet 100** integrated control systems said to provide central management of a company's entire information processing network.

The Controlnet 200 provides control of data communications matrix-switching systems and analog access and sparing systems, as well as access to network performance monitoring systems. The Controlnet 100 system controls multiple data processing switching, monitoring and testing and fiber-optic channel extension for IBM and compatible computers.

Both are field upgradable to the Masternet 300, which integrates control of both data processing and data communications resources.

Pricing begins at $30,600 for Masternet 300 and $19,750 for the Controlnet 100 and 200.

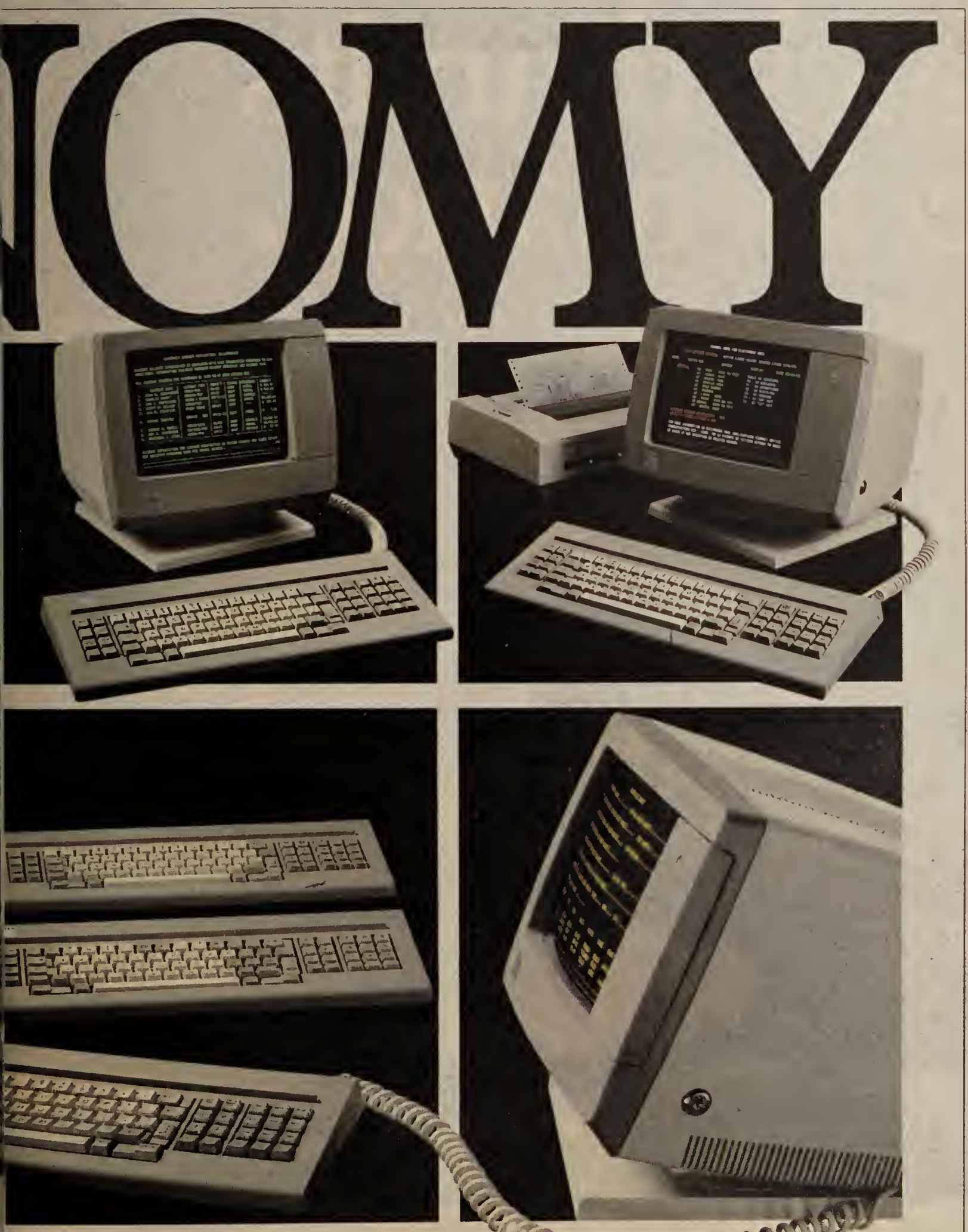
Data Switch, 1 Enterprise Drive, Shelton, Conn. 06484.

Protocol converters

Hewlett-Packard Co. has announced the **HP 18198A state simulator**, the **HP 18154A interface kit** and the **HP 18178A/18197A interface kit** and **pod**.

These X.21 analysis and certifica-

Continued on page 113



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Continued from page 111

tion software and interface products are designed for use with HP 4951, HP's field-portable protocol analyzer or its counterpart, the HP 4953A.

The HP 18198A state simulator is for testing the X.21 protocol and networks. The HP 18154A interface kit with the HP 4953A monitors, simulates and analyzes switched-circuit X.21 data traffic between data terminal equipment and data-circuit terminating equipment. The 18178A/18197A interface kit and pod is said to be a complete X.21 field-service testing tool.

The 18198A costs $7,000. The 18154A costs $1,250. The 18178A interface kit costs $750 and requires the 18197A pod, which costs $1,150.

Hewlett-Packard, 3000 Hanover St., Palo Alto, Calif. 94304.

■

Advanced Computer Communications has announced the **ACS 9310**, a communications interface said to allow IBM and IBM-compatible mainframes to communicate directly over an Ethernet local-area network.

The ACS 9310 consists of an integrated package of hardware and Transmission Control Protocol/Internal Protocol networking software. The software is the company's distribution of the University of California at Los Angeles Arpanet Control Program installed on the host running MVS. It consists of seven protocol segments.

The unit connects the block multiplexer channel of the IBM system to the standard 10M bit/sec. Ethernet.

The ACS 9310 costs $35,000.

Advanced Computer Communications, 720 Santa Barbara St., Santa Barbara, Calif. 93101.

■

Black Box Corp. has introduced a line of **interface converters** said to allow integration of all conversion possibilities among RS-232, RS-422 and V.35.

The 232/422 Interface Converter allows for bidirectional data transfer and interconnection of RS-232 and RS-422 interface circuits.

The RS-422/V.35 Interface Converter provides for interconnection of RS-422 and V.35 interface circuits. It supports 16 active V.35 leads and the necessary RS-422 leads. The RS-232/V.35 Interface Converter supports 14 active V.35 and 11 active RS-232 leads.

The 232/422 costs $219 for the stand-alone and $184 for the card. The other two cost $295 for the stand-alones and $260 for the cards.

Black Box, P.O. Box 12800, Pittsburgh, Pa. 15241.

Multiplexers/modems

Emulex Corp. has introduced the **CS41 T1** communications multiplexer for Digital Equipment Corp.'s Unibus systems.

The CS41 is said to connect up to 144 asynchronous terminals to a VAX with a single controller. When used with a drop and insert multipler voice, synchronous data, high fidelity audio, compressed video and slow-scan video can be combined with asynchronous data over a single line.

The CS41 emulates the asynchronous portion of DEC's DMF controller, providing direct memory access operation with no special programming, the vendor said.

The CS41, with 24 lines and full modem control, costs $5,500.

Emulex, P.O. Box 6725, 3545 Harbor Blvd., Costa Mesa, Calif. 92626.

■

Canoga Perkins has added the **2250** to the Gray Hound Modem series.

The 2250 is a fiber-optic modem featuring asynchronous speeds up to 100K bit/sec. and synchronous speeds to 76.8K bit/sec. It features internal/external clocking, full handshaking, loop back and long-distance option. It is available with RS-422, RS-423/232 and V.35 interfaces.

The 2250 is priced at $495.

Canoga Perkins, 6635 Independence Ave., Canoga Park, Calif. 91303.

Local-area networks

Project Software & Development, Inc. has introduced **Maximo LAN**, a local-area network version of the Maximo maintenance system.

The Maximo LAN runs on the IBM Personal Computer AT. Up to 25 Maximo users can create and share files and records.

Maximo LAN is available as a turnkey system including software, AT workstation with 640K bytes of memory, 1.2M-byte floppy disk drive and color monitor, a 3Com Corp. 3Server70 with a 70M-byte hard disk, a 60M-byte tape backup, communications software and a mouse.

The Maximo LAN system is priced from $41,450.

Project Software & Development, 20 University Road, Cambridge, Mass. 02138.

Test equipment

Digitech Industries, Inc. has released the **Series 700** data communications network analyzers.

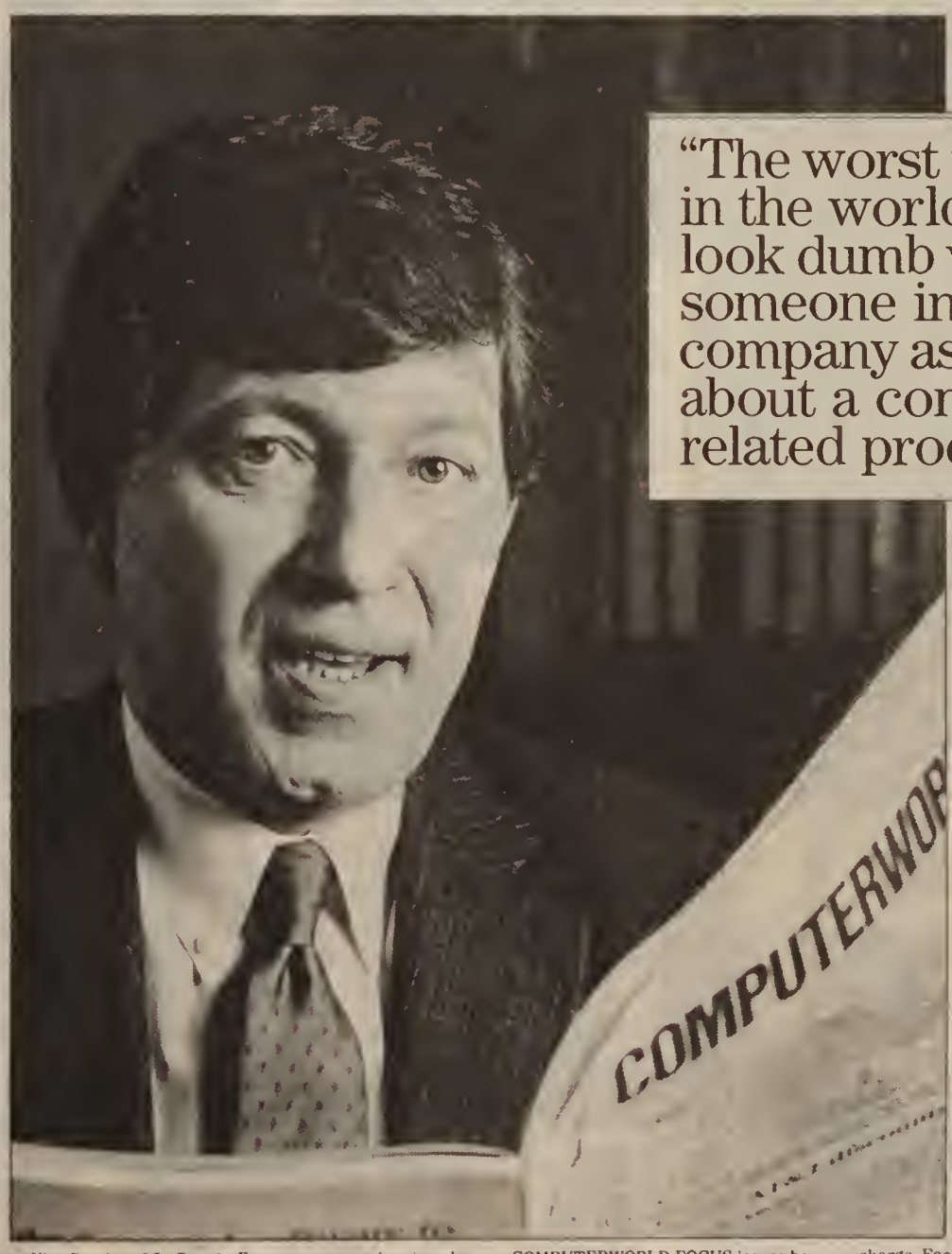
The Series 700 consists of two units that can capture data at 64K bit/sec. or monitor, trap, analyze and perform interactive tests at 19.2K bit/sec.

The analyzers also test bit error-rates and perform parity and block checks.

According to the vendor, data and test results can be stored to a 128K-byte capture buffer on the Model 700 or to a 700K-byte microdisk on the Model 710.

Prices for the Series 700 start at $3,995.

Digitech Industries, P.O. Box 547, 66 Grove St., Ridgefield, Conn. 06877.



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A PUBLICATION OF CW COMMUNICATIONS

Talk is Cheap.

It's Performance That Counts.

Today's system software buying decisions will affect your company for years to come.

Before you select a vendor, talk to people you can trust.

If you're about to invest in system software for your mainframe, here's some free advice that may surprise you:

Go slow.

The decision you're making will be felt for years to come throughout your entire organization. So don't try to shortcut the selection process.

And in particular, don't make a decision without talking to people with first-hand experience—the users of the products in question.

Naturally, we believe that Software AG products offer the best solutions available to the problems you face. And we'd like to have an opportunity to convince you—not by competitive claims and counterclaims, but by demonstrated performance in real-world customer sites.

In the meantime, we'd like to offer a few thoughts on some factors that contribute to performance.

Needed: integrated, long-term, worldwide solutions.

If you've been involved in data processing for any length of time, you already know more than enough about the dangers of piecemeal "quick fixes". You don't have to be sold on the value of integrated tools that meet a full range of organizational needs through a common language and shared procedures.

But while many vendors preach integration, few practice it on the scale of Software AG. From our core products, ADABAS and NATURAL, we have created an entire universe of software products that simultaneously meet the needs of everyone from MIS professionals to end users with no computer experience.

We're also integrated in another way—geographically. As more and more organizations seek to coordinate resources and data on a worldwide basis, they need a caliber of support that is consistent worldwide. Software AG's reach is unique among independent software vendors—with products installed in 52 countries.

Fourth-generation technology: Who needs it? Who's got it?

A lot of vendors have expended a lot of hot air on the subject of fourth generation languages. And we'd be the last to deny that a well-designed "4GL" can be a phenomenal productivity tool—as much as 10 to 20 times more productive than COBOL, for instance.

But if you want to see *performance* in a fourth-generation system, not just a language, the list of contenders narrows way down. We suggest starting with any of the 400,000 programmers who've been using NATURAL since 1979.

It's the world's most widely installed, widely used fourth-generation language. NATURAL is far more than a language. It is a completely integrated environment that can handle from the complex to the simple using a common syntax.

Industry surveys repeatedly rate Software AG #1.

It's one thing for a vendor to be proud of its products. It's another for an entire industry to share in that high regard.

Yet for the last three years, that's just what happened. Each time the ballots have been counted in the annual *Datamation* survey, Software AG has come out #1 in product satisfaction. *That's* performance.

Software AG: high-performance vendor to over 2000 customers.

You could say that the reason we do so well in surveys is that they receive so many responses from our customers. And you'd be right.

Because system software is a long-term investment for most organizations, it inevitably carries with it a long-term relationship with the software vendor.

And for many years, we and our users have recognized the importance of that relationship. In fact, we have worked together to shape it in the interests of delivering the best possible product performance.

But while we're glad our users take the trouble to respond to surveys, we have no control over their comments.

Which makes it all the more gratifying to see the survey results. And all the more imperative that you hear what users have to say—before you buy.

Just give us a call today. Or send in the coupon. We'll be glad to put you in touch with Software AG users in situations comparable to yours, so you can find out for yourself what industry insiders have known all along:

Anyone can talk. But when it comes to performance, Software AG stands alone.

Call us at 1-800-336-3761.
(In Virginia and Canada, call 1-703-860-5050.)

CW0414

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Hardware_____ Software_____

SOFTWARE AG

11800 Sunrise Valley Drive, Reston, VA 22091

The Instrumentation Products Division of **Beckman Industrial Corp.** has introduced the **Easy Bert 1**, a bit error-rate tester for trouble-shooting digital data transmission channels.

Easy Bert 1 is a hand-held unit designed for loop-back testing, end-to-end testing, monitoring data transmission lines and simulation testing. It features breaker switches on the main signal lines and an error injection button. It offers user-selectable bit/sec. rates and five data transmission testing capabilities.

Easy Bert 1 costs $395.

Beckman Industrial, 630 Puente St., Brea, Calif. 92621.

Auxiliary equipment

ITT Corp.'s Business & Consumer Communications Division has announced an **electronic confidencer** for ITT System 3100 proprietary telephones.

The electronic confidencer is said to improve performance of the ITT System 3100 proprietary, 10-button and 20-button telephones in high-noise environments. It reduces the volume of background noise without reducing the transmitted volume of normal speech.

The confidencer costs $68.50.

ITT, 6131 Falls of the Neuse Road, Raleigh, N.C. 27609.

SYSTEMS & PERIPHERALS

Processors

Compudas Corp. has announced **Sentinel**, a single-board intelligent controller.

The 16-bit, Intel Corp. 80186/8087-based computer is said to integrate analog and digital I/O, pulse accumulation and frequency inputs. It supports RS-232, RS-422, RS-423 and a 250K bit/sec. standard local-area network. It offers complete on-board diagnostics, a dual floppy disk controller, battery-backed-up real-time clock, random-access memory disk, four serial ports and data acquisition up to 10,000 samples per sec.

Sentinel is priced at $4,500.

Compudas, P.O. Box 4688, 61 Brown Road, Ithaca, N.Y. 14852.

■

Pertec Computer Co. has added the **Sabre 4235, 4255** and **4280** Pick Systems Pick-based computers to its Sabre product line.

The compact Model 4235 supports up to 36 RS-232 ports for terminal or printers. It supports more than 500M bytes of hard-disk storage.

The Models 4255 and 4280 support up to 44 RS-232 ports, 8M bytes of random-access memory, a built-in ½-in. magnetic tape drive and more than 500M bytes and 2.6G bytes of hard-disk storage, respectively. The Model 4255 is configured with 5¼-in., 85M-byte Winchester disk drives, and the Model 4280 is equipped with 8-in., 330M-byte Winchesters.

All Sabre models come with the Sabre Productivity Center and System Builder. Prices start at $24,750.

Pertec Computer Co., 17032 Armstrong Ave., Irvine, Calif. 92714.

■

Aptec Computer Systems, Inc. has announced the **IOC-MV2** interface package said to link its I/O computer, the IOC-2400, to the Digital Equipment Corp. Microvax II.

The IOC-MV2 consists of a Q-bus board that resides in the Microvax II computer and a Unibus board that resides in a BA11 expansion chassis. Also included in the package is a DD11 backplane and complete I/O computer software support.

The interface costs $4,900.

Aptec, 10180 S.W. Nimbus Ave., Portland, Ore. 97223.

CAD/CAM/CAE

CIS, Inc. has announced the **Medusa CAD/CAM system**, a mechanical computer-aided design and manufacturing application of Digital Equipment Corp.'s Vaxstation II/GPX workstation.

The Medusa system is said to offer two-dimensional design, drafting and detailing with a three-dimensional solid modeler. Users will be able to run concurrent applications using the product's multiwindowing and multitasking capabiities.

The Medusa Vaxstation II/GPX system will be priced around $40,000 to $50,000 for a single-user system.

CIS, 201 Burlington Road, Bedford, Mass. 01730.

Terminals

Add Electronics Corp. has announced the **ADD/Plus 8000 series** point-of-sale terminals.

The terminals are ASCII or IBM 5255 compatible. They can be used for point-of-sale applications via an RS-232 or twinaxial connector. They feature a numeric-only or an alpha-numeric keyboard and a 14-in. screen.

Prices start at $2,995.

Add Electronics, 7375 Pittsford-Victor Road, Victor, N.Y. 14564.

Printers/Plotters

CFR Systems has announced the **Printlink 928**, a printer output device designed to interface the Wang Laboratories, Inc. OIS and VS two-wire I/O to any RS-232 or Centronics Data Computer Corp. parallel printer.

The device is said to be recognized by the host Wang system as one of its own daisy printers. It may be firmware-specified for special orders, software features and printer protocol requirements.

The Printlink 928 costs $1,900.

CFR Systems, 18 Granite St., Haverhill, Mass. 01830.

How to be seen at NCC by people who will be there — and by people who won't be

As many as 70,000 computer-involved professionals, your customers and potential customers, will be at NCC in Las Vegas this June 16-19. And you'll no doubt make contact with many of them at the show.

But you can also make contact with a great many more — 687,300, to be specific. In the three issues surrounding NCC, Computerworld will give extensive, in-depth coverage of this major event. Our Preview issue of June 9, chock-full of product announcements and information, offers a great opportunity to tell those planning to attend where your exhibit can be found. And it offers an opportunity to tell those who won't be there about your products.

Our Show issue of June 16, containing still more product information, will be distributed by the thousands from our booth at NCC. It's your chance to make nonattendees part of the show — and your exhibit.

And our June 23 Wrap-up issue will take a close look at what happened at NCC. Plus, it gives you a chance to reinforce your NCC message after the show.

So don't miss this opportunity to extend your NCC program far beyond Las Vegas — and into offices — with the help of Computerworld and these three special issues.

Call your Computerworld representative today to reserve your space in these NCC issues. Or call Ed Marecki, Vice President/Sales, at (617) 879-0700.

ISSUE	NCC Preview	NCC Show	NCC Wrap-up
ISSUE DATE	June 9	June 16	June 23
COLOR CLOSING	May 23	May 30	June 6
B/W CLOSING	May 30	June 5	June 13

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NEW PRODUCTS/COMMUNICATIONS

North Atlantic Industries, Inc.'s **Peripheral Products Division** has introduced the **Tempest 220**, the first in a family of color multimode dot matrix printers designed to meet NACSIM 5100A specifications.

The Tempest 220 features both IBM and IDS color printer compatibility as well as top, front and bottom friction paper feed. Other features include speeds ranging from 215 char./sec. for draft to 45 char./sec. for letter-quality performance, the ability to store up to four letter-quality fonts on-line, a 12.7K-byte buffer and both Centronics Data Computer Corp. parallel and RS-232 serial interfaces.

The Tempest 220 costs $3,890.

North Atlantic Industries, 60 Plant Ave., Hauppauge, N.Y. 11788.

Power supplies

RTE Deltec has released an **upsized version** of its **6000 series** uninterruptible power systems.

According to the vendor, the product line can now support 25% larger inductive loads than before. The cabinet size remains the same.

The upsized units are priced starting at $27,900.

RTE Deltac, 2727 Kurtz St., San Diego, Calif. 92110.

■

Alpha Technologies, Inc. has announced the **Alpha 1000** uninterruptible power source.

The Alpha 1000 is a 1,000VA backup power source said to keep microcomputers, small minicomputers, telephone private branch exchanges and other power-sensitive electronic equipment operating during power failures or brownouts.

The Alpha 1000 has no on/off switch. It provides two hours of backup time and has automatic periodic self-testing as well as remote status and alarm monitoring.

The Alpha 1000 costs $2,600.

Alpha Technologies, 2767 Alpha Way, Bellingham, Wash. 98225.

Components

EMC Corp. has announced its 256K-byte and 512K-byte **memory cards** for the IBM System/36.

Both boards are said to use 256K-byte random-access memory technology. They feature on-board error correcting code, an on-line/off-line switch, an activity light and a hard-fault indicator.

The 256K-byte board costs $985. The 512K-byte board costs $1,975.

EMC, 12 Mercer Road, Natick, Mass. 01760.

■

Interphase Corp. has announced the **V/ESDI 3201** enhanced small device interface (ESDI) controller.

The single-board controller is said to be able to implement an intelligent caching scheme. Once it has completed a read operation and has transferred data, it will continue to read sequential data into the cache.

The V/ESDI 3201 was designed to meet the demand for ESDI 5¼-in. Winchester disk drives. It supports simultaneous disk and bus activity as well as present and future data transfer rates and addressing.

It is priced at $1,995.

Interphase, 2925 Merrell Road, Dallas, Texas 75229.

PRICE REDUCTIONS

NCR Corp. has announced that it has lowered the price of its **6416 laser printer**.

The 6416 laser printer operates in the daisywheel-compatible mode or the International Standards Organization mode.

It produces eight letter-quality page/min. and comes standard with four typefaces. It is compatible with IBM PC-DOS, Microsoft Corp. MS-DOS and Digital Research, Inc.'s CP/M operating system.

The 6416 laser printer interfaces with a personal computer or small business sytem through an RS-232C or Centronics Data Computer Corp. interface.

The new price is $2,795.

NCR, 1700 S. Patterson Blvd., Dayton, Ohio 45479.

IBM's Database 2 [DB2]*

XCI has experience with over 5 major database management systems. We chose to work only with the best: **IBM's Database 2***. Two year's experience consulting and training with DB2 distinguishes XCI from its competitors. Our seminar emphasis and length can be tailored to meet your needs. Hands-on instruction is given at your site.

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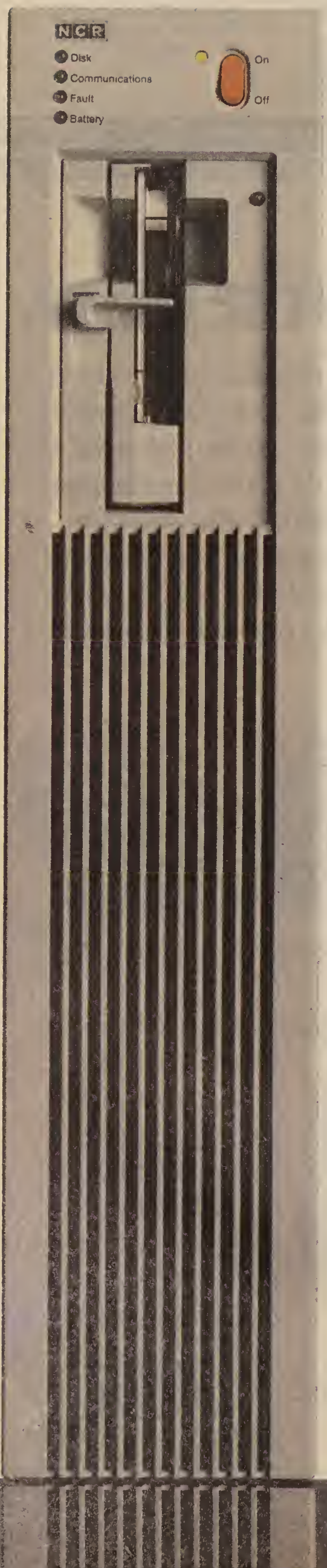
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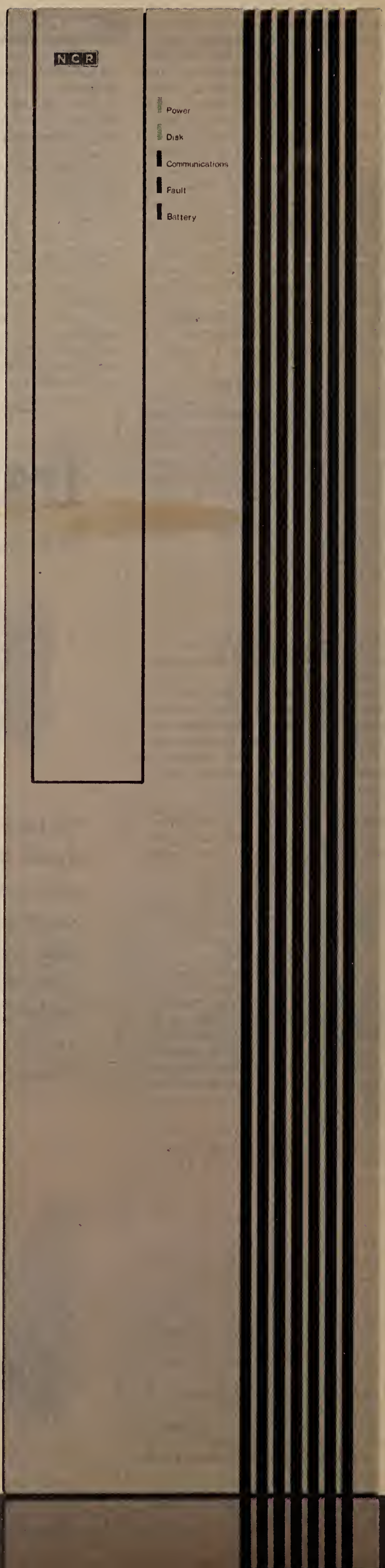
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TOWER^3

Tower® to the third power: MiniTower (1-8 users), Tower XP (1-16 users), and the new Tower 32 (1-32 users). Everything you've always loved about a Tower, in a size to fit any customer need.

NCR packs every Tower with all the features that have made us a power in the OEM market: a UNIX* operating system that virtually never PANICs, extensive remote and in-service diagnostics, consistent error logging, power failure recovery, and much more.

And now, with the addition of the new Tower 32, you can offer your customers performance two to three times that of even the Tower XP. Memory capacity up to 16MB, with an amazing 14MB per program. SCSI (Small Computer Systems Interface) for large disk unit capacity. And connectivity for up to 32 users.

Compatibility between Towers means that as your customers grow, so can their Tower investment. MiniTower to Tower XP to Tower 32. With a minimum of software and support investment.

And, maximum profitability.

Plus, when you put the Tower family to work for any of your customers, you're putting the power of a $4 billion corporation to work for you.

NCR product quality is unparalleled. We spend over a quarter of a billion dollars a year on R&D. Our nit-picking reliability fanatics subject every Tower to an unprecedented barrage of reliability tests. We maintain a standing army of 7,000 service representatives in 400 field locations nationwide. And more.

All to be sure that every Tower you sell lives up to our reputation. And yours.

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OEM Systems Division, NCR Corporation, U.S. Data Processing Group, USG-1, Dayton, OH 45479. Nationwide (800) CALL NCR.

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OFF THE PRESS
Michael L. Sullivan-Trainor

BOOK REVIEWS

FOURTH AND FIFTH GENERATION PROGRAMMING LANGUAGES
By Dimitris Chorafas

With fourth- and fifth-generation programming languages promising faster and more powerful tools for applications development, computer professionals have new opportunities to implement software in novel, more productive ways.

Chorafas zeros in on these opportunities in a guide meant to update experienced computer professionals and enlighten advanced users in the use of higher level language applications.

Involved in the computer industry since 1953, Chorafas draws comparisons between past concepts of data processing and current potentials offered by fourth- and fifth-generation languages, including integrated software, data base and expert systems applications. In addition, Chorafas covers training nonprofessionals to use spreadsheets, graphics and integrated software.

This Volume 1 covers integrated software, data base languages and expert systems. Volume 2 will focus on the Unix operating system.

Hardcover, 283 pages, $36.95, ISBN 0-07-010864-1, by Professional and General Books, McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, N.Y. 10020.

THE POWER OF LOTUS 1-2-3, RELEASE 2
By Robert Williams

Geared to the business person who wants to use Lotus Development Corp.'s 1-2-3 without studying the complex user documentation, this training manual is a keystroke-by-keystroke guide to a series of software applications.

Each application is described in detail and accompanied by a list of operations, keyboard functions and commands. In addition, an explanation is given of each format and of the purpose of the formulas required.

The book covers checkbook management, accounts payable, invoicing and record keeping, accounts receivable, mailing labels, stock portfolios, consolidated budgets, amortization schedules and sales commission applications of Lotus 1-2-3.

Paperback, 314 pages, $19.95, ISBN 0-943518-64-4, by Management Information Source, Inc., 1107 N.W. 14th Ave., Portland, Ore. 97209.

CRITICAL ISSUES IN OFFICE AUTOMATION
By Walter Kleinschrod

The author uses his many years of experience as a magazine editor and office systems watcher to explore office automation issues for nontechnical corporate managers.

Rather than presenting a cookbook of office systems planning, this work challenges readers to examine significant questions about OA. By presenting multiple answers to these questions from managers, consultants, vendors and fellow journalists, Klienschrod encourages readers to draw their own conclusions about the best approach to office automation.

Issues addressed include the confusion about the definition of office automation, whether there are real OA productivity gains and the impact of new office technology on workers and the workplace.

In addition, Kleinschrod touches on the basics of equipment standards, security and software selection.

Hardcover, 223 pages, $28.95, ISBN 0-07-035034-5, by Professional and General Books, McGraw-Hill Book Co., 1221 Avenue of the Americas, New York, N.Y. 10020.

THE IBM WAY
By Buck Rodgers

Buck Rodgers, the former vice-president of marketing for IBM, takes the reader on a journey into the corporate giant's inner workings. However, rather than revealing a complex and powerful organization, he presents IBM as a successful company driven by basic human qualities that are as important to the Fortune 500 as they are to the local grocery store.

With a forward by Thomas J. Peters, coauthor of *In Search of Excellence*, this book is an unabashed tribute to IBM from one of its avid disciples.

It focuses on the principles that have guided IBM since its inception — respecting the individual, providing the best service to the customer and pursuing excellence.

After 10 years running the marketing organization and a career of working his way to the top of IBM, Rodgers states, naturally enough, that it is a commitment to these principles that makes the corporation a success.

He charts this commitment through descriptions of the founders, personal anecdotes and examinations of IBM's policies and programs.

Hardcover, 235 pages, $17.95, ISBN 0-06-015522-1, by Harper and Row Publishers, Inc., 10 East St., New York, N.Y. 10022.

Publishers wishing to have their books considered for review can direct books, press releases, catalogs or other information to Michael Sullivan-Trainor, Book Review Editor, Computerworld, *P.O. Box 9171, 375 Cochituate Road, Framingham, Mass. 01701-9171.*

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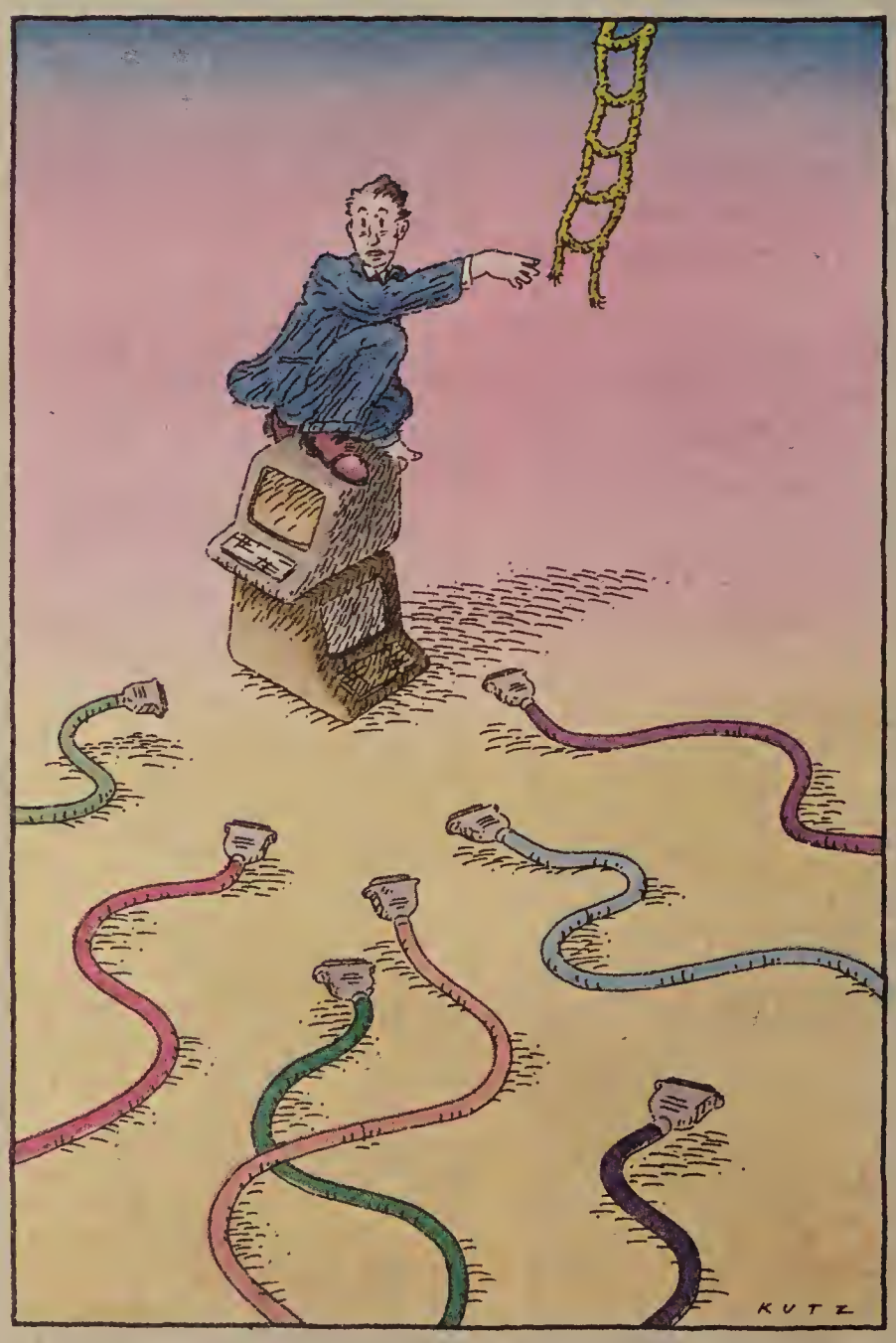

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Runaway costs. Clutter. Delays. Downtime. Familiar cabling bogeys that disappear when you install Teltone's Data Carrier System. Because DCS uses existing phone lines instead of RS-232-C cabling as the transmission medium, terminal installation becomes fast and simple. And moving terminals is about as easy as moving telephone extension numbers.

DCS transmits full duplex 9600 bps synchronous or asynchronous data over standard PBX lines at the same time those lines carry voice and switching signals. A small unit at each workstation multiplexes data onto the phone line at frequencies above the voice band. This provides a dedicated data link without affecting operation of the telephone.

At your PBX wiring room or EDP center, the data is removed from the phone line by a similar unit and connected to your computer through a standard RS-232-C interface. The telephone line continues to the PBX for normal telephone operation.

No need for a digital PBX, no need for modems.

Sound like a dream? It's real: Over 50,000 channels of similar Teltone equipment are installed and working in large and small businesses around the U.S. and Europe. Teltone has been supplying telecommunications equipment, engineering and applications support for the past 17 years.

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In Canada write Teltone Limited, 183 Amber St., Markham, Ontario L3R 3B4.

CALENDAR

WEEK OF APRIL 20

APRIL 20-24, CHICAGO — **Robots 10 Conference and Exposition.** Contact: Robotics International of the Society of Manufacturing Engineers Public Relations, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

APRIL 20-25, NEW ORLEANS — **Twenty-Fourth Annual Conference of the Association for Educational Data Systems.** Contact: Association for Educational Data Systems — '86, P.O. Box 5689, Columbus, Ga. 31906.

APRIL 21, NEWTON, MASS. — **The Computer Industry in Massachusetts: Future Directions.** Contact: Deborah Dupee, Association for Women in Computing, Program Director, Suite 21, 66 Chiswick Road, Brookline, Mass. 02146.

APRIL 21, SAN FRANCISCO — **How to Manage Your Toughest Disaster Recovery Planning Issues.** Contact: Kathy Haupers, CHI/COR Information Management, Inc., 10 Riverside Plaza, Chicago, Ill. 60606.

APRIL 21-23, BEDFORD, MASS. — **Institute for Graphic Communication Document Processing Conference.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

APRIL 21-24, WASHINGTON, D.C. — **Sixth International Conference on Decision Support Systems.** Contact: Julie Eldridge, Decision Support Systems — '86, 290 Westminster St., Providence, R.I. 02903.

APRIL 22-25, BOSTON — **Conceptual/Logical Modeling and Design: An Integrated Approach to Data and Process Methodology.** Contact: Bob Davoli, Charles River Development, 483 Beacon St., Boston, Mass. 02115.

APRIL 23-24, PALO ALTO, CALIF. — **The California Computer Show.** Contact: Dana Denardi, Suite 204, 289 S. San Antonio Road, Los Altos, Calif. 94022.

APRIL 23-25, DALLAS — **Eighteenth International Management MIS Conference.** Contact: Bruce Brammer, Paper Industry Management Association, 2400 E. Oakton St., Arlington Heights, Ill. 60005.

APRIL 26, NEW YORK — **Fourth Annual APL as a Tool of Thought.** Contact: Devon McCormick, New York Special Interest Group on APL PDS, Suite 524, 660 Amsterdam Ave., New York, N.Y. 10025.

WEEK OF APRIL 27

APRIL 27-29, MONTEREY, CALIF. — **Document-Based Optical Mass Memories.** Contact: Institute for Graphic Communication, 375 Commonwealth Ave., Boston, Mass. 02115.

APRIL 28-29, MILWAUKEE — **Uninterruptible Power Systems: Design, Selection and Specification.** Contact: Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

APRIL 28-30, ALBUQUERQUE, N.M. — **Integrated Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176. Also being held June 23-25 in Albuquerque.

APRIL 28-30, AVIGNON, FRANCE — **Sixth International Workshop on Expert Systems and Their Applications.** Contact: Jean-Claude Rault, Agence de l'Informatique, Tour Fiat — Cedex 16, 92084 Paris — La Defense, France.

APRIL 28-MAY 1, VANCOUVER, B.C. — **Congress '86.** Contact: Sunny L. Kae, Congress Chairman, P.O. Box 86279, North Vancouver, B.C. V7L 4J8.

APRIL 28-MAY 2, RENO, NEV. — **Use, Inc. Spring Computer Conference.** Contact: Use, Inc., Box 461, Bladensburg, Md. 20710.

APRIL 29-30, NEW YORK — **Intro to Lotus — Advanced Lotus.** Contact: Center for Advanced Data Processing, Suite 402, 450 7th Ave., New York, N.Y. 10123.

MAY 1-2, TEMPE, ARIZ. — **Logic Programming and Its Applications In Expert Systems.** Contact: Center for Professional Development, College of Engineering and Applied Sciences, Arizona State University, Tempe, Ariz. 85287.

There is value added in having one product do the work of two.

How unlikely it would seem for something as unattractive as the oyster to be able to produce something as exquisite as the pearl. Indeed, it is exceedingly rare that something designed for one specific task should perform another so well.

That juxtaposition, however, merely reinforces the philosophy behind the CIT 50+ terminal.

For this one terminal emulates both the DEC VT100 (ANSI) and the Wyse WY-50 (ASCII) and allows you to add great versatility to your systems.

It is also crafted to replace the VT52 and VT102. And the Wyse WY-75, with even more complete VT100 emulations. Further, it is compatible with other ASCII terminals, such as the Lear Siegler ADM 31, Hazeltine 1500, ADDS Viewpoint, and TeleVideo 910, 920, and 925.

For many manufacturers, such capabilities would have been enough. But stopping so few steps from the beginning is not the CIE Terminals way.

That is why we have priced the CIT 50+ lower than the DEC VT100. Now you can get both ASCII and ANSI capabilities for less than you would have had to pay for either in the past.

In both modes, you get 24 x 80/132 format with a 25th status line, 26th label line, variable speed smooth scroll, and variable time CRT saver.

Call us to find out more about the CIT 50+. As with many things in life, one should look past mere external beauty to discover the beauty within.

CIE TERMINALS

Where craftsmanship is still a tradition.

CIE Terminals, Inc., 2505 McCabe Way, Irvine, CA 92714-6297. 1-800-624-2516.

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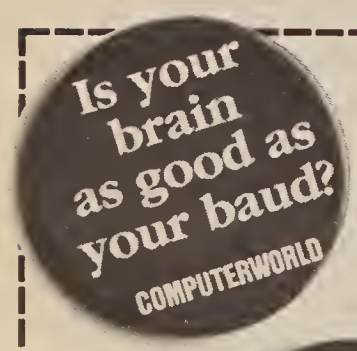
But you may NOT send us everything that comes into your head. Our offices aren't big enough to handle all that paper! Please take the time to narrow your ideas down to the two best you can come up with (test them on your friends).

All entries will be shown to our panel of judges, who will be tied to their chairs until selections are complete. Six winning slogans will be picked, and everyone who sent in one of those slogans will be eligibile for a prize. If you are the only one to send in a winning slogan, you win the prize. If more than one person had the same intelligent idea, we'll pick the prize winner out of a hat. Prize winners will receive a $100 certificate good towards the purchase of software from a friendly neighborhood computer store.

All decisions of the judges will be final, and no representations as to their competence, skill, or sense of humor are being made. All entries will become the property of CW Communications/Inc. Deadline for entries is May 2, 1986 at our offices in Framingham, MA.



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COMPUTER INDUSTRY

Section begins on page 156

Harris' new exec expects 25% decline in earnings, flat sales

Market weaknesses, fluctuating net income cited in poor showing

By James A. Martin

MELBOURNE, Fla. — In his first week as chief executive officer and president of Harris Corp., John T. Hartley predicted a 25% decline in earnings and flat sales for the company's current fiscal year.

Hartley also said the minicomputer, communications and office automation vendor would consider discontinuing slow-moving product lines and eliminating or consolidating product divisions to bring operating costs down further.

"We have a challenge to improve our overall operating effectiveness in the way that we can have profitable growth in spite of market difficulties," Hartley said in a recent interview. "That is our highest priority, and I intend to spend a lot of time reevaluating all our areas of activity, with the possibility that some might be reprioritized."

Sales for Harris' 1985 fiscal year were $2.3 billion, up 14% from $1.9 billion the year earlier. Net income was flat, however, at $80 million. For the first two quarters of fiscal 1986, which ends in June, sales were $1.1 billion, remaining mostly flat from the same period in 1984. But net income plummeted to $27.4 million, compared with $47 million a year earlier.

Net income for Harris has been fluctuating for several years. In 1981, for example, profit was $105 million, which dropped to $80.1 million in 1982 and to $63.9 million in 1983. In 1984, net income rose back to $80.4 million and dropped slightly to $80.2 million in 1985.

Harris' John T. Hartley

Continued weakness in three Harris markets — business and information systems, communications and semiconductors — will result in the earnings drop and flat sales, Hartley said.

The Harris government systems sector, which provides communications and data processing systems for such agencies as the National Aeronautics and Space Administration, is the company's most profitable and stable sector.

Hartley became affiliated with Harris in 1956 as a research engineer for Radiation, Inc., which merged with and became a division of the Harris-Intertype Corp. in 1967. He was named president of Harris in 1978 and chief operating officer in 1982. Hartley succeeded Joseph Boyd as chief executive officer effective April 1, with Boyd remaining in his capacity as chairman of the board.

Hartley's relatively pessimistic comments indicate a positive change from the past, when the company had often made "rosy predictions that didn't materialize, causing the financial community to become disenchanted with them," according to one Harris watcher, Roger Manley, professor of management and department head at the Florida Institute of Technology in Melbourne.

As the new CEO of a troubled company, Hartley most likely has one year to turn things around. "If he doesn't," Manley said, "then the company could very well be a good candidate for a takeover." He added that Harris has a good line of products, but has been faced with sluggish markets and does not enjoy the same high profile that some of its competitors do.

Last December, Harris merged its analog and digital products divisions under the semiconductor sector, eliminating about 100 administrative positions in the process. Earlier this year, the company merged its government satellite and government data communications divisions into one — the newly created government communications systems division — eliminating 100 to 150 positions [CW, Feb. 24].

Further staff cuts possible

There is a chance that further staff reductions could occur this year, Hartley added, without elaborating on where and when such cuts might occur. "I am hoping we will not require any substantial amount of additional reductions," Hartley said.

Along with its attempts to streamline operations, Harris is hoping to carve out larger markets for its superminicomputers and communications products. For example, the company is developing a digital packet-switching network, Sophonet, that provides a fit with Harris office automation products.

Sophonet is a joint venture between Harris and N. V. Philips and will allow communications between Harris processors and terminals via

See **EXEC** page 126

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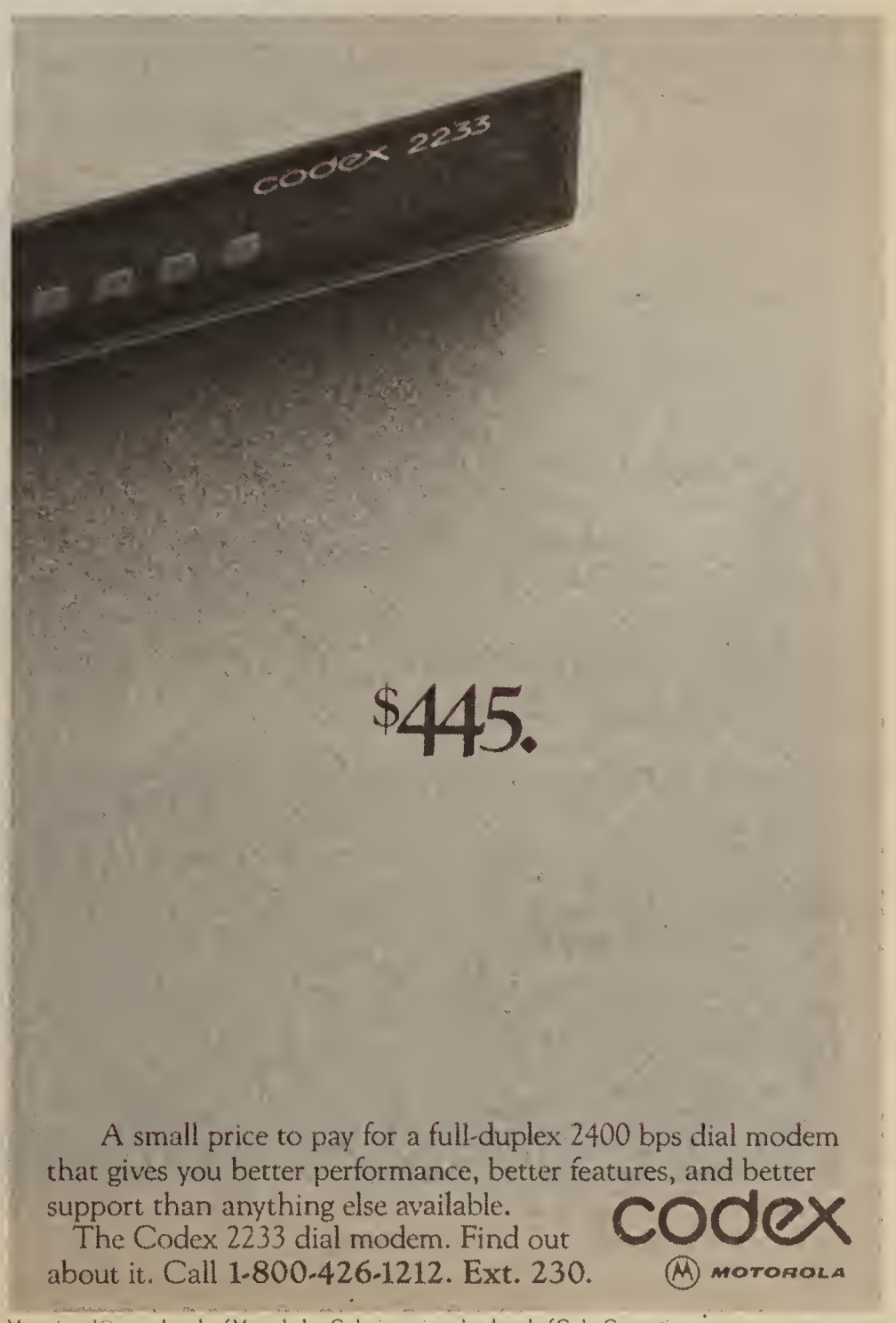

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NOVELL

Milestones Ahead.

Federal market grows for DP service vendors, analysts say

Budget cutbacks focus increased attention on service contractors

By Mitch Betts

WASHINGTON, D.C. — The federal government market for DP professional services, such as software development and systems integration, has become increasingly price-sensitive due to budget cuts and competition but will experience strong growth through 1990, according to market analysts.

Input, Inc., a Mountain View, Calif.-based research firm, recently predicted that the federal market for DP services will grow at an average annual rate of 20% in the next few years, reaching $6.9 billion in 1990.

Likewise, International Data Corp.'s (IDC) Washington Division, located in McLean, Va., recently reported that DP services are the most promising part of the federal DP budget for vendors and noted the considerable success of systems integrators in winning government contracts [CW, Feb. 10].

Although being a consultant to the government may seem like a vendor's gold mine, Input's report cautioned that the services market has become increasingly competitive in the last few years, with new competitors such as minority-owned businesses, aerospace contractors and not-for-profit institutions.

The combination of budget pressures, competition and government procurement rules has created a price-sensitive market where contract winners are forced to live with smaller profits and tightly controlled overhead costs, Input said.

The federal government is under pressure to use outside contractors because of cost-cutting hiring freezes and a lack of in-house expertise, according to Input's report, "Federal Government Professional Services Market."

In addition, the president's Office of Management and Budget (OMB) has ordered agencies to contract with the commercial sector for DP services whenever that is cost-effective.

"With mounting OMB pressure to find more efficient solutions (that is, contracting out), the share of the budget allocated to services is likely to continue growing at a substantial rate, detracting from dollars which might have been otherwise expended by programs developed and operated in-house," said an IDC federal budget analysis.

Much to the OMB's chagrin, the federal agencies tend to develop custom software programs, either in-house or via contractors, rather than use off-the-shelf packages. Consequently, software development will continue to be the largest segment of the DP services market through 1990, Input predicted.

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Exec expects drop in earnings

From page 123

satellite. The project is in the final stages of development, Hartley said, and should be available later this year. Harris' strategy for its office automation line is to open up the previously proprietary architecture in order to allow communications with other vendor products.

The first of these products, the Concept 4300 from Harris' Integrated Systems Marketing Group, runs on

Computer Industry section begins on page 156.

Microsoft Corp.'s Xenix operating system and supports up to eight Harris workstations or IBM Personal Computers under PC-DOS 3.1 [CW, March 10].

Despite the present sluggishness of its markets, Harris is not considering venturing into any new territories, Hartley said. "We are not looking for newer, greener pastures.

"I am reasonably optimistic," he added. "There are signals the economy will improve, and Harris will improve along with it."

■

Plant to close

ATLANTA — Harris Corp. plans to shut down its Thomaston, Ga., production plant within three to six months, eliminating about 140 jobs, the company said last week. The plant is operated by Harris' business information systems sector and has been a production site for office automation products.

Production of work group processors will be transferred to Harris' Nashua, N.H., plant, with office workstation production transferred to Far East suppliers, said Wesley E. Cantrell, senior vice-president for Harris business information systems.

"This is necessary to increase manufacturing competitiveness and reduce product costs," he said.

— James A. Martin

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Businessland acquires 36-store retail chain in Midwest

Responds to IBM freeze on dealers

By Maura McEnaney

SAN JOSE, Calif. — Growth through acquisition is the new theme at computer store giant Businessland, Inc., which has responded to IBM's recent freeze on new computer dealers by acquiring a 36-store retail chain in the Midwest. Businessland recently announced plans to acquire United Telecommunications, Inc. subsidiary Amerisource of Kansas City, Kan., which would bring Businessland's store count to 105.

Businessland's new growth pattern may have caused some internal trouble, however. Just days after the Amerisource acquisition, Ronald Watkins resigned after only six months as president "to pursue start-up opportunities," the company announced.

Cofounder and Chief Executive Officer David Norman will assume the presidency while the company looks for a replacement.

Rumors of a clash in management style surrounded the resignation of Watkins, a former IBM director of information systems and administration, but were denied by Businessland Senior Vice-President Enzo Torresi. "There is absolutely no relationship between Ron's resignation and the acquisition," Torresi told *Computerworld* last week.

"Ron wanted more of a start-up kind of company," Torresi continued. "Maybe he expected more of an intrapreneurial-type atmosphere here. We brought in a president from the outside in order to get structured, professional management in place. That might have been a bit of a disappointment or a disillusionment for him."

In his six months as president, Watkins was responsible for hiring several key regional managers, including former Osborne Computer Corp. President Ronald Brown.

Businessland will pay $20 million in stock and notes for the Amerisource acquisition, which is expected to be finalized in May.

Acquisitions are somewhat out of the ordinary for publicly held Businessland, which has grown into a $267 million business since its founding in 1982. With the exception of a three-store acquisition in Arizona last year, all of Businessland's chains were funded and launched by the company.

Cooperation wins the chips

From page 156

tor Corp. and Xerox Corp., meanwhile, brings together National Semiconductor's CMOS expertise and semiconductor manufacturing with Xerox's strength in advanced semiconductor architecture and systems design.

The long-range goal for Xerox and National Semiconductor is to produce application-specific semiconductors such as gate arrays. Their coming together indicates, as does the AMD-Sony tie-up, that smaller players in the semiconductor business (Xerox and Sony) can make pacts with larger players that both help ensure the smaller players' survival and give the larger players a shot at new markets.

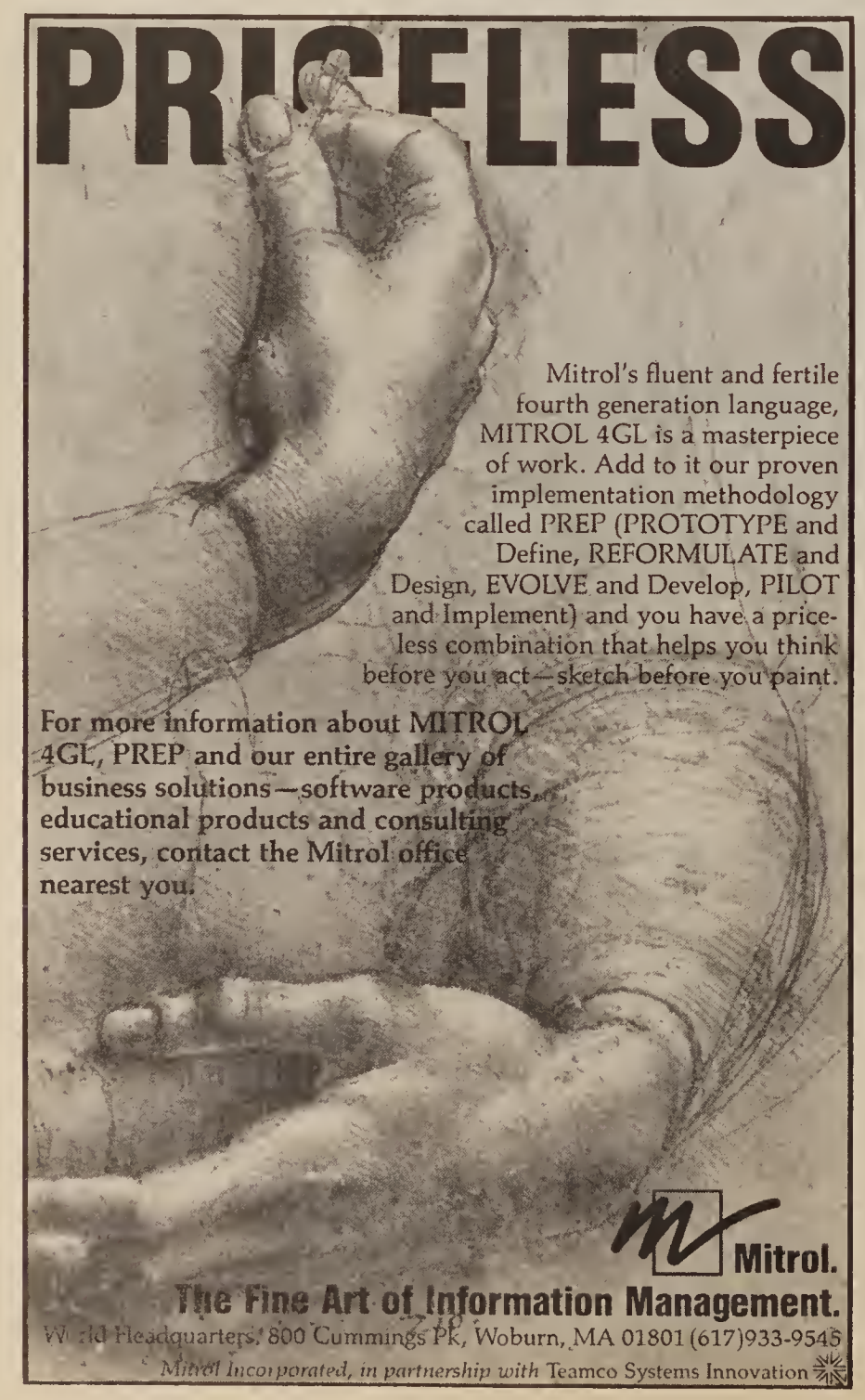
The cooperative agreements indicate that the smaller chip industry players have realized the folly of trying to go it alone. If this becomes a trend, it will prove that teamwork and cooperation is sometimes the best way to win in competition.

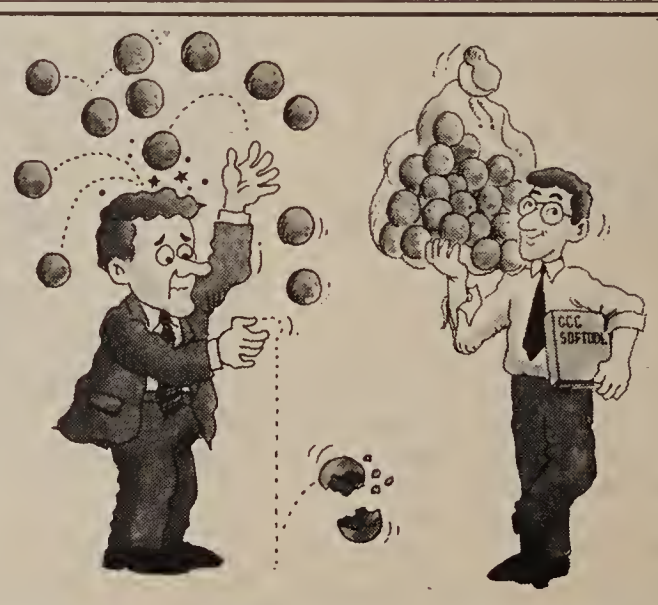
■

But it is a dark April at Wang Laboratories, Inc. With a palpable sense of deja vu, Wang marketing boss J. Carl Masi gazed into his crystal ball last week and decided he could do better elsewhere. After former President John F. Cunningham's departure last year, Masi had emerged as the leading nonfamily candidate to take the reins of the OA giant when 65-year-old company founder An Wang steps aside. But that 'non' sports a capital N — and now only time stands between No. 1 son Fred Wang and the knighting ceremony.

Masi apparently became just as frustrated as Cunningham with that patriarchal power structure. What veteran Wang observers reiterated last week has become painfully obvious: Without the right family/ethnic affiliation, one is only going to rise so far inside the corporate headquarters known as "The Tower" (which is rumored to be on the market for a sale-leaseback) in Lowell, Mass.

It is not the most enlightened management philosophy around — and its worst manifestations always seem to surface when things are financially sour. In the wake of a $109 million quarterly loss and massive layoffs last summer, the "Doctor" returned to a prominent role in day-to-day operations. Last week, Masi's job was effectively eliminated so that the three top marketing executives report directly to Dr. Wang. For Wang shareholders and users, that is surely not a sign of financial and organizational health.





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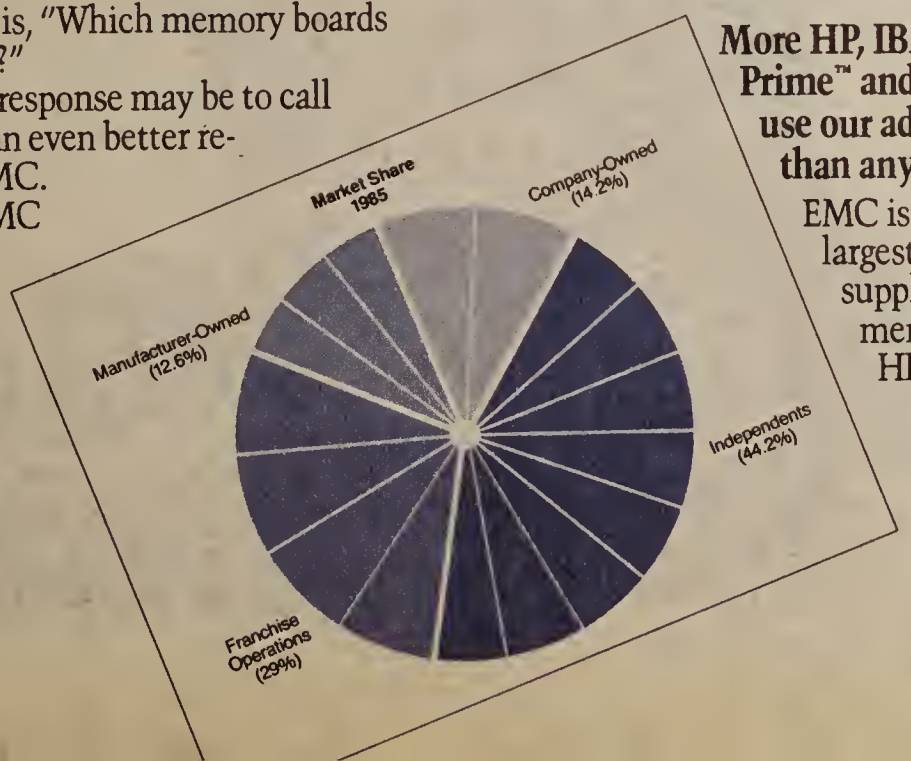

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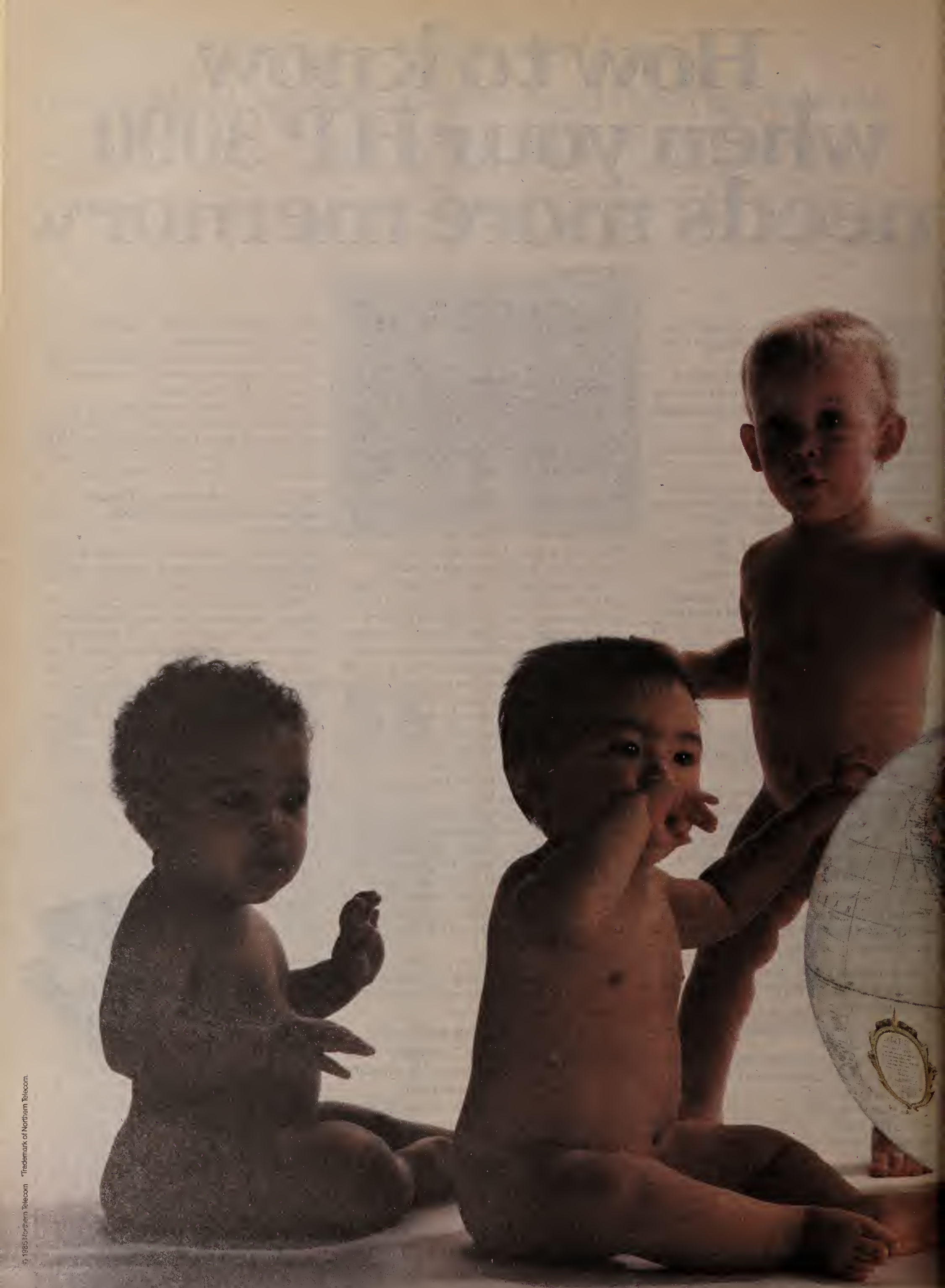

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NETWORKING

Electronic publishing begins to penetrate corporate world

Xyvision seeks niche in emerging market

By Eddy Goldberg

WAKEFIELD, Mass. — Although commercial printers have been quick to accept the competitive advantages of electronic publishing systems, selling to corporate users has been a slower process. Xyvision, Inc., a supplier of high-end computer-integrated publishing systems, is attempting to leap that barrier, according to James W. Sole, who recently left Xerox Corp. after 16 years to become Xyvision's president and chief operating officer.

"There is still a fair amount of confusion among in-plant customers," Soles explains. "Vendors are still in the conceptual selling phase as to what corporate electronic publishing is." Soles says the growth of in-house electronic publishing today is limited by the inability of vendors to sell solutions to specific user problems and by the lag in buyers' learning of how to use it in their companies.

How a corporation integrates an in-plant publishing system into its MIS department is another issue companies will face. Soles believes that there will be turf wars as an essentially new kid on the corporate block seeks its place within a company's overall DP functions.

Electronic publishing has the potential to become a major operations center in many corporations, says Jose Ramos, publisher of "What You See Is What You Get" (WYSIWYG), a Redwood City, Calif.-based newsletter on corporate electronic publishing. Because everyone in a company publishes some type of document, he reasons, there is economic sense in centralizing all publishing functions to share expensive peripherals, such as laser printers and typesetting machines. How in-plant publishing will tie into MIS remains to be seen.

Dedicated electronic publishing systems, such as Xyvision's, also are changing the way documentation is perceived within a company. Once considered a static product, documents are increasingly being viewed as dynamic, ongoing processes. Some documents have 25-year life cycles — longer than most employees — and are subject to constant revisions. Storing large amounts of text and complex graphics on a data base speeds those revisions, resulting in tremendous time and cost savings.

According to Xyvision founder and Chairman Laurence S. Liebson, quoted in WYSIWYG, "The market has emerged more slowly than many people had expected, but every indication out there tells us that things are taking off. Professional publishers are already beginning to buy the next-generation product."

Falling costs for workstations and laser printers, as well as an increase in applications software, are helping to speed market growth. But they are also changing the rules of the game for early market entrants.

> ***Once considered a static product, documents are increasingly being viewed as dynamic, ongoing processes.***

One of Xyvision's strengths, Soles says, is that it offers a system architecture able to interface with most installed input and output devices. However, according to Ramos, smaller companies like Xyvision that manufacture their own dedicated systems may soon be facing serious problems.

Low-cost workstations that can run software from companies like highly publicized Interleaf, Inc. of Cambridge, Mass., pose a potential threat to dedicated systems vendors, WYSIWYG's Ramos says. In addition to cutting its starter system price from $50,000 to $30,000, Interleaf has unbundled its software and offers it on a variety of workstations for $2,000 to $3,000.

The two companies have, so far, been selling to different markets. Whereas Xyvision claims leadership in the commercial market, Interleaf is achieving significant market share in the in-house segment.

Xyvision's business today is split about evenly between in-plant and commercial printer sales, says Soles, but the commercial market is becoming saturated. He anticipates a shift over the next three to five years, with in-plant sales growth outpacing the commercial printing segment by two to one.

Xyvision's previous sales have been largely to automotive, aerospace and defense, book and journal publishing and computer and electronics companies that have large, ongoing technical documentation needs.

Xyvision will report about $15 million in revenue for the fiscal year ending March 31 and anticipates doubling its growth annually for the next several years. There are approximately 100 Xyvision systems installed.

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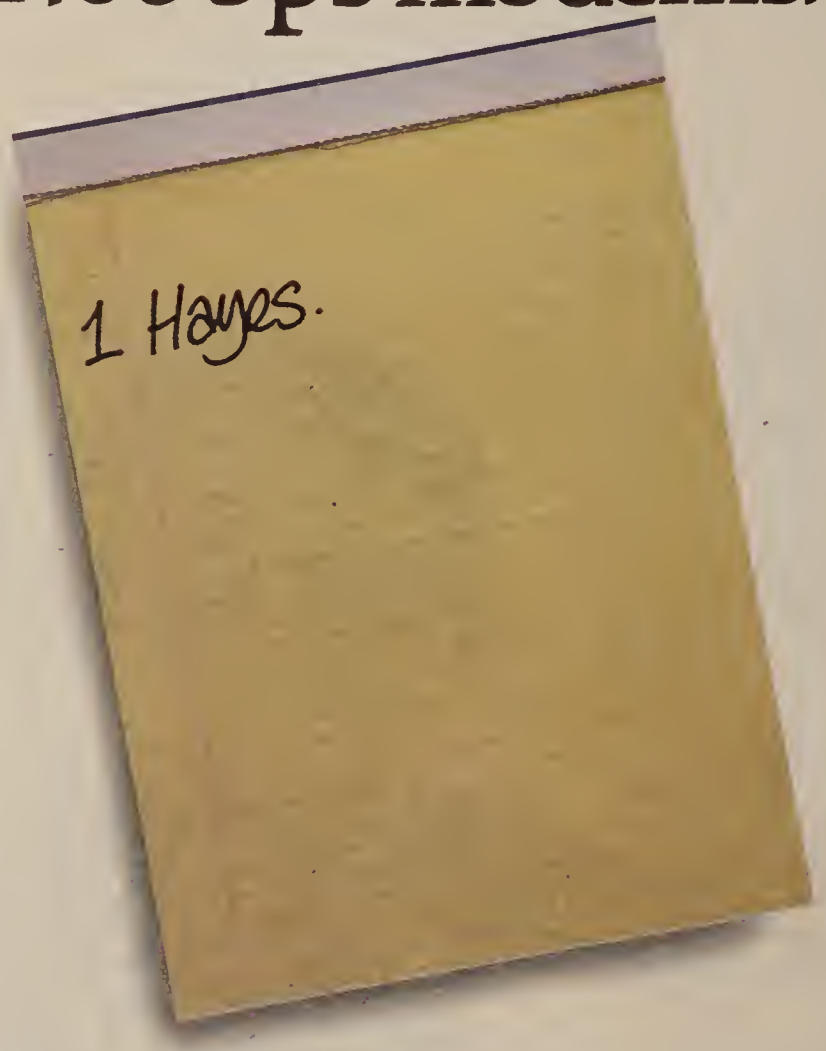

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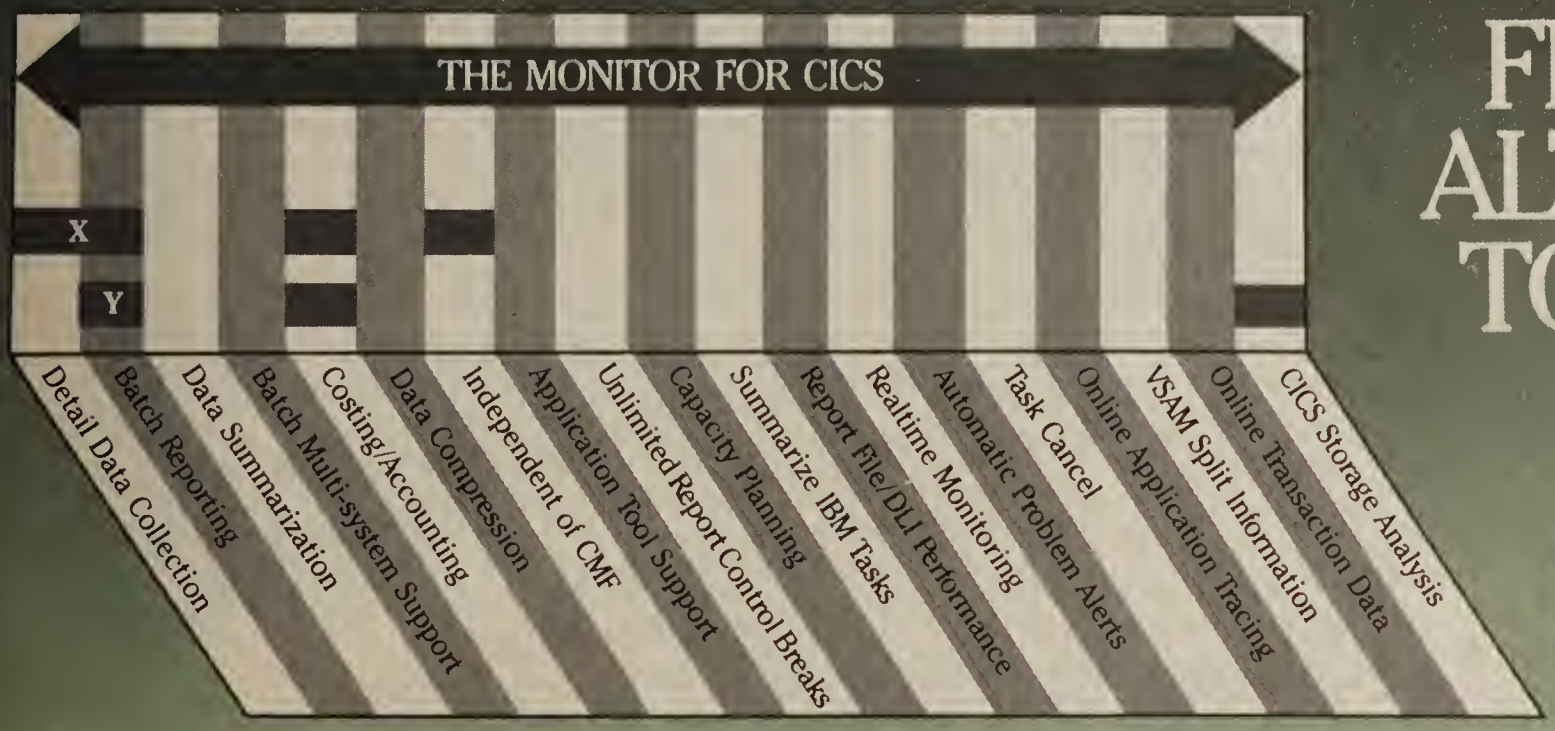

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IBM merges divisions to strengthen manufacturing strategy

Big Blue stakes out factory floor

By Rosemary Hamilton

RYE BROOK, N.Y. — IBM announced last week that it will merge its Manufacturing Systems Division — the heart of its factory automation effort — with its Engineering Systems Division in an attempt to sharpen the focus of its computer-integrated manufacturing (CIM) strategy.

The two divisions, both independent business units, will now be called the Industry Systems Products Division and will be headquarted at the engineering division facility in Milford, Conn.

Robert Williams, head of Engineering Systems, was named general manager of the new business unit. John Klein, who headed up the Boca Raton, Fla.-based Manufacturing Systems Division, will continue in that capacity and report to Williams.

Quietly pursued factory market

Since 1983, IBM has quietly pursued the factory automation market through its Manufacturing Systems Division. The Engineering Systems Division, a separate effort, focused on computer-aided manufacturing and computer-aided design. The recently announced RT Personal Computer came out of this division.

Together, these divisions will "create a single management focus to address CIM," a company spokesman said.

This is the latest step in a process that began 14 years ago when IBM first began dabbling in factory automation with the development of robotics for its own internal use.

Established unit in 1983

But it was not until 1983 that it established its first official factory automation unit. And, like the new Industry Systems Products Division, it was a merging of units that originally were not related but, over time, had developed common goals.

The Manufacturing Systems Division was founded in 1983 as an independent business unit, much like the neighboring Entry Systems Division. It was a merging of three separate units: the robotics division, which had been an independent unit since 1972; the in-house systems integrator division; and the industrial computer division, a spin-off from the Series/1 business.

The Industrial Computer line, introduced in 1984, is the heart of this division, and all future products will be based on its architecture, said Dick Schulte, manager of market development and requirements in the Manufacturing Systems Division.

The machine is essentially an IBM Personal Computer, Personal Computer XT or AT inside a ruggedized shell.

"We thought we could take what we were good at," Schulte said, "and drag it onto the factory floor." Schulte said the decision resulted from a sense throughout the IBM organization that there were already enough differing computer architectures.

According to Schulte, the Manufacturing Systems Division chose the PC architecture because "it is ongoing. There is growth in the future for this architecture." Because this architecture already existed, it was also an inepensive way to launch a new product line.

That leaves the IBM Series/1 in limbo. A general-purpose system that had been selling into manfacturing sites, the Series/1 will not be phased out, although "over time, far more Industrial Computers will go into customer sites than Series/1s," Schulte said.

The robotics division was established to provide automated equipment to IBM manufacturing facilities. It decided to launch a commercial robotics effort in 1982, shortly before the Manufacturing Systems Division was officially launched, for "companies that had similar

See **IBM** page 137

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ADP's Weston appointed to succeed Taub as chairman

Founder will retain role with board

By Alan Alper

ROSELAND, N.J. — Automated Data Processing, Inc. (ADP) has named Chief Executive Officer and President Josh S. Weston as chairman, succeeding the firm's founder Henry Taub.

Replacing Weston as ADP president is group President William J. Turner, who joins Weston in the newly created office of the chairman. Reporting to the office of the chairman are group Presidents Ric Duques and Robert J. Levinson and Senior Vice-Presidents Fred S. Lafer and Arthur F. Weinbach.

ADP's Weinbach said the change was made at Taub's suggestion. "Henry wanted to make the change for a long time and step down, and Josh is ready to make the move."

Founded ADP in 1949

Taub, 58, founded ADP in 1949. He was chairman until 1977 when then-President Frank R. Lautenberg was promoted to succeed him. Taub returned to the position in 1982 when Lautenberg was elected to the U.S. Senate from New Jersey. Taub is remaining with the company as chairman of the executive committee of the computing services firm's board and was named honorary chairman.

Weinbach said Weston and Turner will share the responsibilities of running day-to-day operations. "It's an evolutionary thing," he noted. "Josh will turn over the things he currently does to Bill as time goes on."

The firm has not yet named a new president of the specialized service group, which Turner continues to head, Weinbach said.

IBM merges divisions

From page 135

problems," Schulte said.

The first release was a Scara model, the 7535, which was originally developed by Japanese vendor Sankyo Seiki. The Scara robots could be programmed to perform simple assembly tasks.

A more advanced robot, the Gantry, introduced in 1983, was entirely IBM-developed and based on Advanced Manufacturing Language (AML) software. It can be programmed with limited intelligence.

The two robots announced last week shortly before the merger are also Scara models, but they boast a significant performance improvement from the older models. They come with AML/2, a new version of AML.

> ***"The two robots announced last week boast a significant performance improvement from the older Scara models."***

From the Industrial PC base, IBM is expanding its offerings to multivendor factory environments. One obvious direction in which the company is expanding is the Manufacturing Automation Protocol (MAP), General Motors Corp.'s emerging standard for all factory floor communications.

Curiously, IBM expects to release two MAP-related software products that run on the Series/1 later this year, even though it is not the core of its manufacturing business strategy.

While the merger last week takes IBM's CIM strategy a step further, it also has a way to go. "We're working for an overall CIM architecture with other divisions, but there's been lots of debate," Schulte said. "I'm not convinced yet that we can come up with just one."

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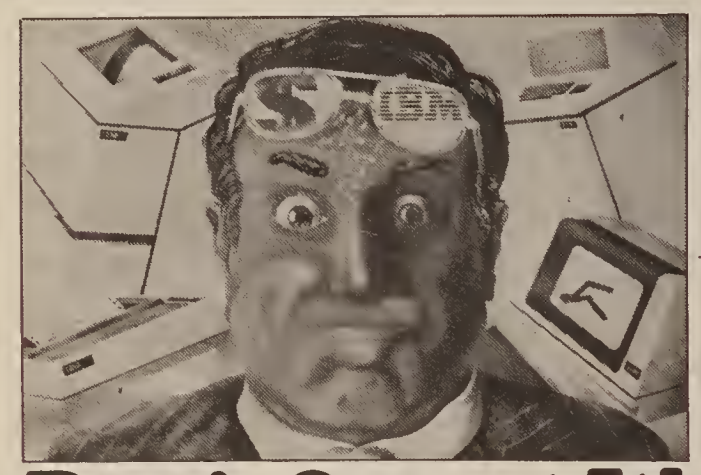

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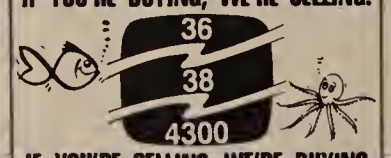

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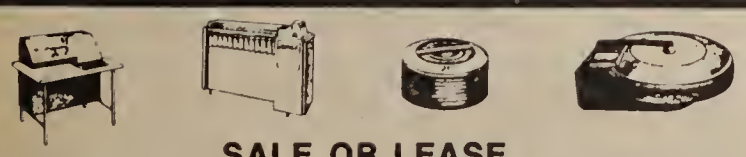

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Proposals will be received by the Human Resources Administration/Department of Social Services, until 5:00 P.M., Friday May 2, 1986

A pre-bidder's conference will be held on 10:00 A.M., April 24, 1986 at 111 Eighth Avenue, 6th Floor, NY., NY.

Request for proposals may be obtained from the HRA Office of Data Processing, 111 Eighth Avenue, NY., NY 10011, Attention: Delia King (Telephone No. 206-3746)

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Proposal forms may be obtained from the Purchasing Office, or by calling (813) 748-4501, extension 3241.

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Anticipated issue date: April 23, 1986

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COMPUTERWORLD's paid circulation climbed to over 129,522 this fall. Folio 400 (Folio Magazine's study of trade publication performance) placed us first in total revenue. As the industry grows, so will **COMPUTERWORLD.** It will continue to offer the high quality news coverage and editorial content that has attracted its readers. What does that mean to you, our advertisers? Good news...in the form of wide exposure.

The Classified section of the newspaper is laid out in an attractive format and is easy to read. It offers classifications to solve a variety of problems:

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A number of Executive Reports and Product Spotlights are scheduled to run in **COMPUTERWORLD** during 1986. Each of these features will focus on one aspect of the computer industry and give our advertisers a chance to reach a more select audience. These are some of the topics the features will cover:

Executive Reports

- Apr 28 - **Software Maintenance**
- May 5 - **Training End Users**
- May 19 - **Electronic & Voice Mail**
- May 26 - **In-house Publishing**
- June 16 - **The Bunch Companies**
- June 30 - **Integrated OA Systems**
- July 21 - **PBX Networks**

Product Spotlights

- May 12 - **Disaster Recovery**
- June 2 - **Word Processing Software**
- June 23 - **Personal Computer Graphics**

COMPUTERWORLD publishes every Monday with an ad deadline of 10 days prior to each issue date. The issue of April 28th will be closing April 18th. You may send in copy to be pubset or camera-ready material (velox or negative) via the mail. We provide telecopier service and will also take ads over the phone.

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Sales Representative — Software Systems Denver branch of highly successful vendor of IBM plug-compatible software seeks a motivated Sales Representative for the Rocky Mountain Region. Requires a solid sales record in the IBM marketplace. To **$80,000.**

Programmer/Analysts — Health Care Expansion Newly formed division of a Denver-based Health Care Services firm seeks professionals to develop new systems and install a major hospital information system. CICS experience a definite plus. Project Managers must have health care installation experience. To **$45,000.**

Systems Programmer — Data Center Expansion Dynamic Denver-based wholesale/retail organization has major growth plans for 1986. Cross train in MVS or CICS based on your current skill-set. Management is highly supportive of Information Systems. To **$40,000.**

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Systems Programmers — New IBM Data Center Ground floor opportunities in systems programming and operations. State-of-the-art, OS/MVS, VTAM, CICS environment. Telecommunications experience highly desirable. Denver location. To **$45,000.**

ADABAS Programmer/Analyst Growing organization with multiple new development projects is seeking a Senior Programmer/Analyst. Requires a strong exposure to ADABAS/NATURAL. Excellent opportunity to use structured methodology in a well-managed professional organization. Denver location. To **$36,000.**

Senior Programmer — Payroll Systems Stable, growing Colorado-based company seeks an experienced Programmer/Analyst to move into a leadership role. Support payroll and accounting software in an OS/MVS environment. Opportunity to learn CICS. Experience with MSA or McCormack and Dodge is highly desirable. To **$35,000.**

Senior Programmer/Analyst — Burroughs Denver division of Fortune 500 firm seeks a self-starting professional to take over development of a very large distribution system. Five years of Burroughs COBOL and good oral communication skills preferred. Travel to Florida likely. To **$42,000.**

Programmer/Analyst — Learn PL/1 Major Denver bank seeks to expand its DP staff. Cross training in PL/1 for OS/COBOL Programmers. Two years experience sought. To **$28,000.**

Senior Software Engineers — R & D High-tech, Salt Lake City-based peripheral manufacturer enjoys phenomenal growth and a location at the foot of the Wasatch Mountains. Low cost of living, high career growth. Three years micro code development required. To **$42,000.**

VAX Consultant Growing division of major computer manufacturer seeks professionals for consulting services to the defense industry. Variety of assignments, excellent professional and technical training. EBI required. Denver location. To **$60,000.**

MOD 204 Consultant State-of-the-art Denver-based organization is developing major new systems using Model 204 DBMS and CICS. Tremendous technical challenge. To **$40,000.**

Systems Programmer Stable Colorado Springs manufacturing organization seeks a junior level Systems Programmer ready to take on key position. IBM OS Sys Gen experience and COBOL knowledge preferred. To **$34,000.**

EDP Auditor Expanding banking organization seeks an EDP Auditor. Previous experience with COBOL and EDP audit preferred. Banking experience is a plus. Denver location. To **$30,000.**

COBOL Programmer Growing Colorado-based insurance company seeks professionals for new development projects. Grow into on-line applications. To **$28,000.**

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MVS Operating System Consultant Major hardware vendor seeks MVS experts. Advise clients on performance, capacity planning, and tuning. Excellent opportunity for technical and personal growth for professionals with a strong MVS O/S knowledge. Denver location. To **$55,000.**

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TANDEM — Programmer/Analyst Join a new development project in a progressive state-of-the-art environment. Industry leader seeks professionals with one to five years experience in TAL, SCOBOL/COBOL. Beautiful Colorado Springs location with a corporation that cares about its employees. To **$44,000.**

TANDEM — Communications Systems Highly successful corporation seeks skilled professionals with at least two years experience in SNAX, EXCHANGE or X.25 communications on TANDEM Systems. An exciting opportunity to be on the leading edge of network systems development. Colorado Springs location. To **$46,000.**

Software Engineers — Optical Disk Systems Participate in the development of software to support the latest generation of Optical Disk Technology. Highly successful industry leader is forming a new development group to support the next generation product. Two to five years SCSI, Controller or Operating Systems Internals experience preferred. Beautiful Front Range Colorado location. To **$65,000.**

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Systems Engineer — Telecommunications Denver division of a major telecommunications corporation seeks Telecommunication Engineers with one or more of the following skills: Broadband Systems development (Voice/Data), Communications Security, Protocol Integration/Interfacing, or System Engineering/Testing. High visibility. To **$44,000.**

COBOL Programmer/Analyst — IMS Salt Lake City division of a major corporation seeks an IMS DB/DC Programmer/Analyst for a new financial systems development project. Work in one of the most advanced systems environments in the West. To **$35,000.**

VAX Systems Programmer — New Projects A major computer corporation seeks DEC VAX Systems Programmers to support multiple new projects. Extensive training available for professionals with two years or more experience with FORTRAN or VMS internals. EBI Clearances strongly preferred. Denver location. To **$55,000.**

Software Engineers — Defense Systems Move to new development projects for various C³I (Communications, Command and Control, Intelligence) Systems. Attractive Colorado location with an opportunity to move ahead. EBI/SBI Clearances strongly preferred. To **$53,000.**

Programmer/Analyst — New IMS Development Division headquarters of a major international firm seeks a professional with two years OS/COBOL experience. Knowledge of IMS DB/DC preferred. Extensive new systems development projects. New Denver data center. To **$32,000.**

Programmer/Analyst — Teller Terminals Join the leading financial institution in Denver in a new development project to install and support IBM 4700 Teller Terminals. Four years experience required with at least two years FCL. To **$37,000.**

Systems Analyst — HOGAN Major financial institution in Colorado seeks a professional with at least one year HOGAN experience. In-house training available. To **$36,000.**

COBOL Programmer/Analyst — New Development Prestigious Denver firm seeks COBOL Programmer/Analyst. Excellent work environment, benefits, and career growth potential. Two or more years experience in an IBM OS/MVS environment helpful with CICS or MSA software experience preferred. To **$38,000.**

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ACP/PARS Programmer/Analyst — Lead Development Fortune 100 financial institution seeks an ACP/PARS Programmer/Analyst with at least three years of ACP/PARS programming experience. Lead development in the ACP area. Excellent opportunity and benefits with a stable, growing organization. Phoenix location. To **$49,000.**

Programmer/Analyst — Manufacturing Major aerospace manufacturer seeks Programmer/Analyst with at least two years of COBOL and CICS experience to support installation and development of manufacturing systems. IMS/DLI experience preferred. To **$38,000.**

Tandem Programmer/Analyst — Banking Major New Mexico banking establishment in beautiful Southwest location seeks a Programmer/Analyst with two or more years experience using TAL, PATHWAY and COBOL. Banking, financial or data communications preferred. ACI net, ATM or POS preferred. To **$35,000.**

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Senior Technical Representative — Software Development Fifth-generation software developer with excellent growth record seeks a Technical Analyst with an in-depth knowledge of IMS DB/DC and/or CICS. Must possess a sales personality and a desire to travel. Scottsdale location. To **$50,000.**

DB2 Database Administrator — Banking Largest bank in Arizona seeks a Database Administrator with two or more years DB2 experience, SQL and both logical and physical design. Excellent benefits. Phoenix location. To **$43,000.**

Manufacturing Systems Analyst Expansion of this major high-tech manufacturer has created a need for a Manufacturing Systems Analyst. Candidate with five years relevant experience in systems development, with emphasis on manufacturing problem definition sought. Consultant background performing feasibility studies and structured design preferred. IMS DB/DC highly desirable. Scottsdale location. To **$45,000.**

Technical Support Analyst — Banking Major banking organization seeks a Technical Support Analyst to participate in systems development. Desires a four-plus year Programmer/Analyst with extensive knowledge of TSO/ISPF, VSAM, COBOL, JCL, CICS and CLISTS. Excellent location and benefits package. Phoenix location. To **$40,000.**

ACP Programmer/Analyst — Training Provided. Corporate Data Communications Group of a stable Phoenix-based firm seeks individuals to participate in the development of sophisticated ACP teleprocessing systems using VTAM, CICS, IMS/DC and MVS. Company offers extensive formal training. To **$41,000.**

Systems Engineers — Microprocessors. Growing Scottsdale firm seeks Senior Technical Software Engineers to lead development and implementation of new microprocessor systems. Thorough knowledge (five or more years) of systems development using high level languages and Assembler on microprocessors sought. Some hardware design or interface experience preferred. B.S.E.E., M.S.E.E. degree highly preferred. Some international travel. To **$54,000.**

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Minicomputer Specialists. Phoenix-based communications firm has multiple projects for mini/micro Programmers and Software Engineers to develop state-of-the-art communications based systems on microcomputers as front-end vehicle to handle line traffic and support multipurpose communications networks. B.S., M.S. degree in C.S. or E.E. sought. To **$40,000.**

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Database Analyst — IMS DB/DC. Prestigious Fortune 500 firm in Phoenix seeks Senior Database Administrator. Five or more years experience in IMS DB/DC with large database exposure sought. Will work with top notch database team in on-line IMS DB/DC systems development. All new development applications, structured development standards, state-of-the-art shop. To **$45,000.**

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Programmer/Analysts and Senior Programmer/Analysts. Major firm in Phoenix with state-of-the-art OS/MVS data center has multiple openings for Programmer/Analysts with two or more years of IMS DB experience. Prefer IMS DC experience, but will train on new development applications for on-line systems. Professional environment, easy commute and excellent corporate benefits. To **$41,000.**

IMS DB/DC Applications Consultant. Consulting group for Fortune 500 firms in the Phoenix area seeks IMS expert. Will be involved in new development applications in financial and manufacturing areas. Excellent benefits, paid overtime, and technical career growth. To **$37,000.**

Systems Analyst — New Corporate Subsidiary. Recently formed subsidiary of a prestigious Fortune 500 corporation seeks an Analyst to assist in the development of new data processing systems. Solid background in COBOL, structured design techniques and previous IMS DB/DC design responsibilities helpful. Phoenix location. To **$38,000.**

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Systems Analyst — Distribution or Financial. Major division of a Fortune 500 corporation seeks an experienced Analyst with three or more years experience in manufacturing, distribution and/or financial information systems. Large systems environment IMS DB/DC exposure preferred. Arizona location. To **$38,000.**

Series 1 Communications Systems Programmer. Headquarters subsidiary of a prestigious national firm, is expanding their communications switching and front-end processing group in Phoenix. Experience in IBM Series 1 using Assembler and EDX for real-time communications switching and interface to SNA networks sought. Will be heavily involved with systems internals, protocol converters, and SNA implementation. To **$42,000.**

Scientific Programmer — Growing Firm New Mexico firm seeks aggressive, technically-oriented individual with expertise in mathematical analysis and simulations. B.S. degree. DEC, VAX and FORTRAN experience sought. To **$30,000; M.S. degree to $40,000; PhD to $48,000.**

Programmer/Analyst — CICS. Well-known New Mexico firm will upgrade systems in 1986. COBOL and CICS experience. To **$33,000.**

Programmer/Analyst Progressive New Mexico OS shop offers an exceptional opportunity in the development of on-line administrative systems. Will consider person with experience using COBOL or Assembler Language. To **$30,000.**

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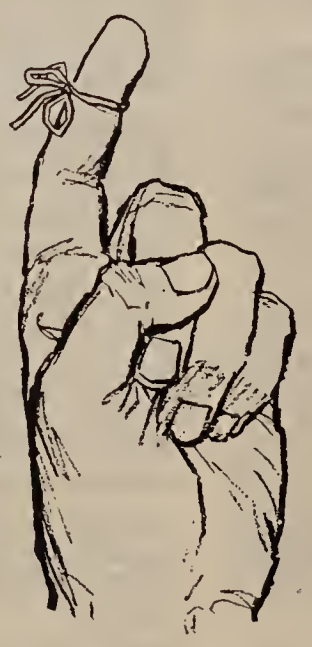

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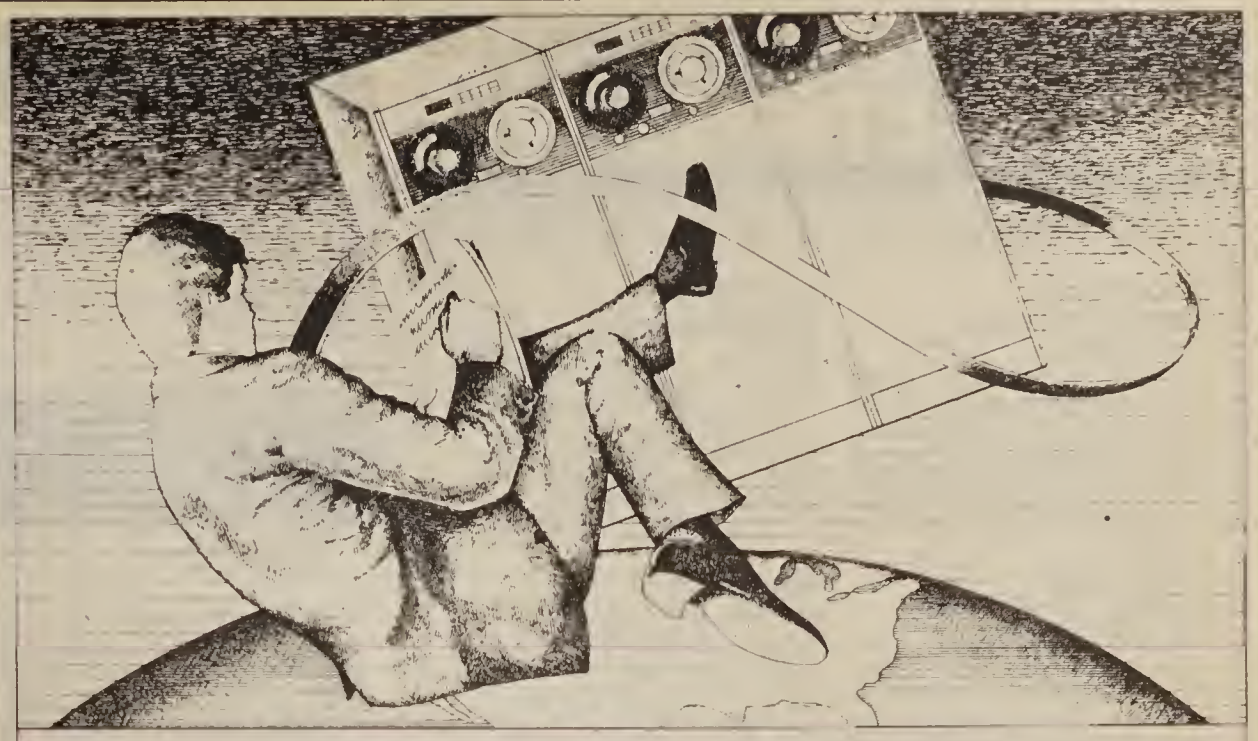

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SIA urges stronger trade laws

Claims Japan ignores antidumping duties

WASHINGTON, D.C. — The Semiconductor Industry Association (SIA), continuing its attack on Japanese trade practices, last week urged the U.S. Congress to reform U.S. trade law because it does not deter or halt the Japanese from selling chips in the U.S. at allegedly below-market prices.

C. Travis Marshall, a Motorola, Inc. executive representing the SIA, told a congressional panel that Japanese firms consider antidumping duties "a small price to pay for taking over the U.S. market in key product areas such as semiconductors."

The representative for the SIA said the trade law revisions should include increasingly stronger sanctions against foreign companies found to have engaged in dumping on more than one occasion and provisions for U.S. companies to sue for financial damages.

Marshall testified before the trade subcommittee of the House of Representatives' Ways and Means Committee, which plans to develop a package of trade legislation in the next few weeks.

— Mitch Betts

Wang revamps; Masi exits firm

From page 156

Masi said there were no "substantial" disagreements between him and Dr. Wang about corporate directions in marketing, but the new management structure essentially left him without any significant role in the operation. "In the last 11 years, there were many times when I wanted to go right and he wanted to go left, so I would go left," Masi said. "This time, I just couldn't make that decision."

Most observers both inside and outside the company called the departure a blow to the company's image, particularly at a time when it appeared to be regaining credibility in the MIS community and showing a gradual financial rebound. Wang's image had hit bottom last summer with its $109 million quarterly loss, 1,600 layoffs and the resignations of former President John F. Cunningham and former Executive Vice-President Jon A. Kropper.

"It sure is bad timing," said Vincent Flanders, associate publisher of "Access '86," a Wang user publication produced in Austin, Texas. "Cunningham left when things were going bad, and now people are wondering if things are really getting better. There's a great new VS 5 and 6, and then Carl goes; something is wrong somewhere. It just doesn't show a lot of stability, and what users need right now is reassurance."

"It's a disruption," said a Wang mid-level manager who requested anonymity. "It says the company hasn't found the answer to what it wants to do. Carl had his faults, but keeping him would have meant stability. There doesn't seem to be any distributed decision-making."

Masi said he would seek a CEO position with a smaller computer firm or a high executive job with a larger company that could lead to the top spot. Both Cunningham, with Computer Consoles, Inc., and Kropper, with Hadco Corp., moved from Wang to head other companies.

Masi's departure further confirmed that Frederick Wang, 35, the company's treasurer and founder's son, is the likely successor to his father to head the firm.

INDUSTRY NOTES

MSA expects smaller quarterly loss

Management Science America, Inc. (MSA) said last week it expects to report a customary first-quarter loss but a much smaller one than in the first quarter of 1985. MSA, which will announce final results later this week, predicted a per-share loss of 2 to 5 cents, compared with 16 cents a year ago. Revenue is expected to increase to $29 million from $25 million. The first-quarter loss is attributable to the seasonal nature of the mainframe software business, the company said.

■

Ridge Computers cofounder David Folger resigned as president and chief executive officer of the company last week, after a reported falling-out with other founders. Ridge also announced it was laying off 30 of its 130 workers at its Santa Clara, Calif., headquarters and closing two sales offices.

■

Intel Corp. last week reported a $36.5 million operating loss for the first quarter as revenue plummeted 25% from year-earlier levels to $280 million. After a $7.6 million one-time gain and provisions for tax credits, the Santa Clara, Calif., chip maker posted a net loss of $22.2 million, or 19 cents per share. Intel earned $10.8 million, or 9 cents per share, in the first quarter of 1985.

■

Motorola, Inc. said its semiconductor products business returned to "moderate profit levels" in the first quarter, after two straight quarters of heavy losses. The firm said the chip unit's profits were about the same as in the year-earlier quarter, and its orders rose 37% although sales fell 10%. The greatest increase in orders came from distribution, industrial and automotive markets.

Sales for the information systems group, which does not include the former Four-Phase Systems unit, were up 6% over year-earlier levels.

Upswing eludes industry as weak earnings predicted

ACTIVE ISSUES
Kathy Porteus

The long-anticipated computer industry upturn will continue to elude most companies as they post March quarter results, most industry analysts say.

"The mainframe environment will be weak through the spring," says Matt Meehan, vice-president with Salomon Brothers, Inc. Yet Salomon Brothers is shifting to a neutral opinion on this group.

Meehan no longer recommends sale of Honeywell (HON — 72), which he expects will report March quarter earnings of 50 cents a share. He remains neutral on IBM (IBM — 149½), based on his recent estimate of first-quarter earnings of $1.75 a share. The only mainframe company Meehan currently recommends is Control Data Corp. (CDA 23¼), which he estimates has lost $1 a share this past quarter.

According to Meehan, the key question regarding these stocks in the June quarter is, Will investors react to negative revisions in second-quarter estimates or to an order rate showing early signs of improvement? Meehan says investors will react more positively to future order momentum "rather than dwell on Wall Street's final cutting of earnings estimates."

Prime Computer, Inc.'s (PRM — 19⅜) recent disclosure of an expected down quarter sent bearish signals throughout the minicomputer industry. "I don't think any minicomputer company has the potential to surprise us with higher-than-expected earnings," says Thomas Rooney, analyst with Donaldson, Lukin & Jenrette Securities Corp. Rooney estimates Prime will earn 18 cents a share vs. 25 cents a share in the same period last year.

"If there is a surprise with Digital Equipment Corp. (DEC — 159¾) this quarter," Rooney says, "it will come on the downside" owing to weaker-than-expected OEM sales. Nevertheless, DEC's earnings, which Rooney estimates will be $2.40 to $2.45 a share, will still show a good yearly comparison.

Rich Edwards, analyst with Robertson, Colman & Stephens, says if Convergent Technologies, Inc. (CVGT — 9) reports earnings, as indicated, of about 5 cents a share on revenues of $80 million, then "the company's break-even point is lower than we had modeled." Prior to Convergent's recent announcement of lower first-quarter revenues, Edwards had estimated the company would earn 5 cents a share on $87 million.

According to Thomas A. Galvin, analyst with Shearson, Lehman Brothers, Inc., Apple Computer, Inc.'s (AAPL — 27¼) expected strong quarter is not indicative of the micro industry. Although relatively strong, microcomputer business, Galvin says, is "not as good as it could be because of concern over IBM price cuts and new product introductions."

For the March quarter, Galvin estimates Apple will earn 50 cents a share, Compaq Computer Corp. (CPQ — 14⅝) will earn 26 cents a share and AST Research, Inc. (ASTA - 17⅛), 55 cents a share.

Because investors tend to watch order patterns more than earnings among semiconductor firms, continued improvements in the industry's bookings are reflected in semiconductor stocks, says Paul Johnson, analyst with L. F. Rothschild, Unterberg Towbin. For the March quarter, Johnson expects earnings levels to remain depressed.

He estimates Advanced Micro Devices, Inc. (AMD — 28½) will lose 15 to 20 cents a share, and Texas Instruments, Inc. (TXN — 119¼) will report a loss of 35 to 50 cents a share. Johnson says he would not be surprised if Motorola, Inc. (MOT — 40⅞) reported a higher profit than the 10 to 15 cents a share now expected.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.

Comdisco settles audit with IRS

From page 156

reported financial statements, current cash flow or the potential future earnings or cash flow of the company."

James Benton, executive director of the Computer Dealers and Lessors Association, said his organization was delighted by the settlement. "It was nothing we didn't expect," he noted.

John Keefe, an analyst with Drexel Burnham Lambert, Inc. in New York, said the IRS audit had a minimal impact on the computer leasing industry. "It may have affected a small number of transactions, but I doubt that mainstream accounting of leases as debt rather than income will change."

In an unrelated matter, Comdisco said that Judge William M. Fay of the U.S. Tax Court ruled that purchasers of the firm's tax-advantaged sale lease-back transactions are entitled to all of the tax benefits stated in the offering memoranda.

Bardagy said the IRS had contended that the tax shelters were not valid because they were not financially sound when they were put together in the early 1980s. "We feel vindicated by the ruling because it proves what we were selling to the public was financially sound and nonabusive," he noted.

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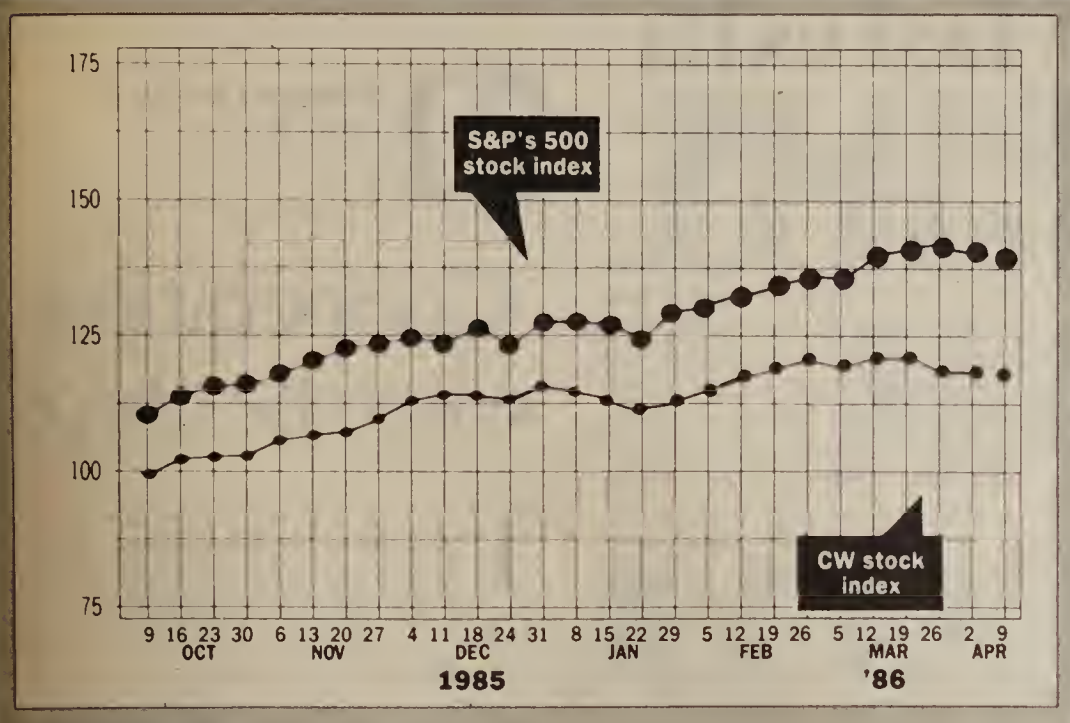

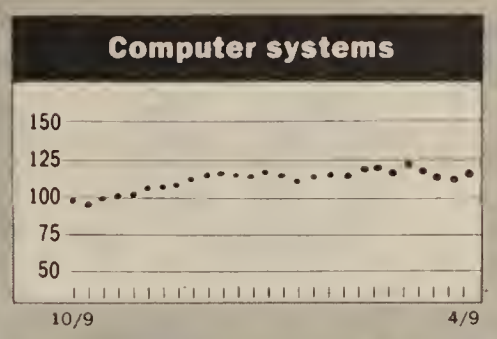

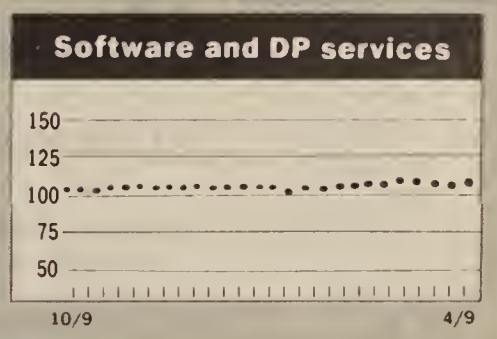

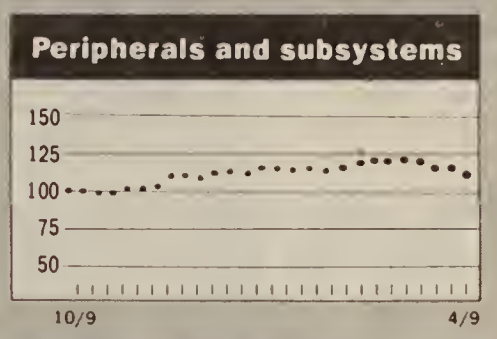

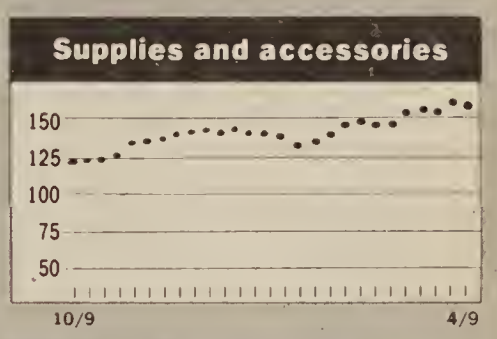

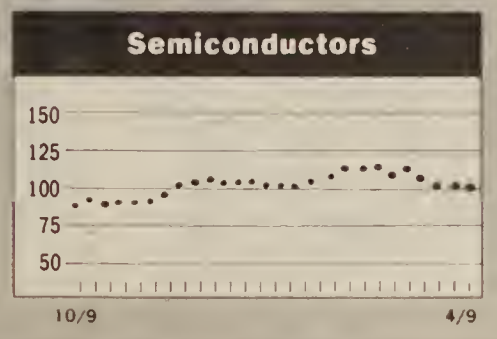

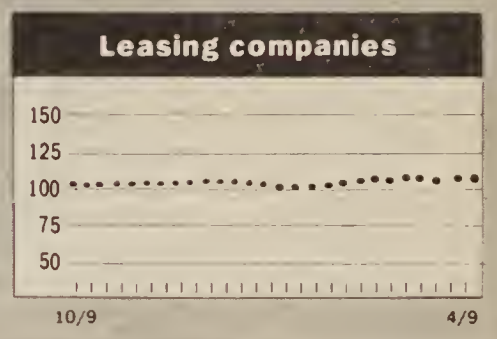

All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.

	4/2/86	4/9/86
Computer systems	118.6	**119.7**
Software and DP services	104.8	**105.0**
Peripherals and subsystems	116.5	**115.6**
Supplies and accessories	155.1	**154.2**
Semiconductors	103.1	**101.9**
Leasing companies	103.9	**104.0**
CW stock index	116.6	**116.4**
Standard and Poor's 500 stock index	140.9	**139.8**

Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, APRIL 9, 1986

EXCH		52-WEEK RANGE (1)		CLOSE APR 9 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS					
O	ALPHA MICROSYSTEMS	5	9	5 1/2	-1/8	-2.2
O	ALTOS COMPUTER SYST	9	17	16 1/4	+3/4	+4.8
A	AMDAHL CORP	10	18	14 5/8	-3/8	-2.5
O	APOLLO COMPUTER	9	31	15 1/4	+3/4	+5.1
O	APPLE COMPUTER INC	14	31	27 1/8	-1/8	-0.4
N	AT&T	19	28	22 1/8	+1/8	+0.5
N	BURROUGHS CORP	52	71	63 1/2	-1 1/4	-1.9
O	COMPAQ COMPUTER CP	5	16	14 1/8	-5/8	-4.2
D	COMPUTER AUTOMATION	1	9	2	+1/8	+6.6
A	COMPUTER CONSOLES	5	14	8	+3/8	+4.9
N	CONTROL DATA CORP	15	39	22 1/8	1 1/4	-5.3
O	CONVERGENT TECHNOL	5	13	9 3/4	+5/8	+6.8
O	CPT CORP	5	8	4 3/4	-3/4	-13.6
N	CRAY RESEARCH INC	25	74	70 1/2	+2 5/8	+3.8
O	DAISY SYSTEMS CORP	11	38	11 3/4	0	0.0
N	DATA GENERAL CORP	31	76	39 7/8	+1 3/8	+3.5
N	DATAPOINT CORP	5	22	5	-1/8	-2.4
N	DIGITAL EQUIPMENT	85	167	162	+7 1/2	+4.8
A	EECO INC	13	16	15 1/2	-1/2	-3.1
N	ELECTRONIC ASSOC.	3	7	6 5/8	+3/4	+12.7
N	FLOATING POINT SYST	18	39	39 3/8	+1	+2.6
N	FOXBORO	22	31	26 1/2	-1 1/8	-4.0
N	GOULD INC	20	38	24 5/8	-2	-7.5
N	HARRIS CORP	22	35	27 3/4	+3/8	+1.3
N	HEWLETT-PACKARD CO	29	45	41 3/4	-3/4	-1.7
N	HONEYWELL INC	54	87	71 3/8	-2 1/8	-2.8
N	IBM	117	158	149 1/4	-1 3/4	-1.1
O	IPL SYSTEMS INC	1	4	2 3/8	+1/8	+5.5
N	ITT CORP	28	47	44 3/4	-1 1/8	-2.4
N	M/A-COM INC	13	24	17	+1/8	+0.7
N	MANAGEMENT ASSIST	2	28	2 1/4	+1/8	+5.8
N	MATSUSHITA ELEC(ADR)	49	84	82 5/8	-1 3/8	-1.6
O	MENTOR GRAPHICS	13	30	13 3/4	-1	-6.7
N	MODULAR COMPUTER SYS	6	8	7 5/8	+1/4	+3.3
N	MOHAWK DATA SCI	1	13	3 1/8	+3/8	+13.6
N	NBI INC	11	20	12 5/8	-1/8	-0.9
N	NCR	25	46	43 5/8	+1 7/8	+4.4
N	PERKIN-ELMER	22	36	30 3/4	+3/8	+1.2
N	PRIME COMPUTER INC	15	27	19 1/2	-1/8	-0.6
N	SPERRY CORP	39	59	53 1/4	+3/4	+1.4
O	STRATUS COMPUTER INC	9	25	19 3/4	0	0.0
O	TANDEM COMPUTERS INC	13	29	23 3/4	-1/8	-0.5
N	TANDY CORP	24	44	38 7/8	-1	-2.5
O	TELEVIDEO SYSTEMS	2	4	3 5/8	+1/4	+7.4
O	TELXON CORP	10	28	28	+2	+7.6
N	TEXAS INSTRUMENTS	86	132	120 3/8	+4 3/8	+3.7
A	ULTIMATE CORP	8	32	28 1/4	+1/4	+0.8
O	VECTOR GRAPHICS INC	1	1	1/8	0	0.0
A	WANG LABS "B"	15	29	18 3/8	+1/2	+2.7
A	WANG LABS "C"	15	29	17 7/8	-1/2	-2.7
N	XEROX CORP	37	72	65 5/8	+1/4	+0.3
	SUPPLIES & ACCESSORIES					
N	AMERICAN BUS PRODS	21	36	36 1/8	+1 1/8	+3.2
N	BARRY WRIGHT	17	29	22 1/8	+1/4	+1.1
A	DUPLEX PRODUCTS INC	13	22	20 3/8	-3/8	-1.8
N	ENNIS BUS. FORMS	14	28	25 1/4	-5/8	-2.4
N	3M COMPANY	74	107	98 1/8	-4 1/8	-4.0
N	MOORE CORP LTD	15	26	25 3/4	-3/8	-1.4
O	STANDARD REGISTER	22	44	44 1/4	+2 1/4	+5.3
N	WALLACE COMP SERVICE	30	48	45 7/8	-2	-4.1

EXCH		52-WEEK RANGE (1)		CLOSE APR 9 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & DP SERVICES					
O	ADVANCED COMP TECH	2	5	4 3/8	-3/8	-7.8
N	ADVANCED SYSTEMS INC	9	20	18	+7/8	+5.1
N	AGS COMPUTERS INC	10	25	21 1/4	-1 1/8	-5.0
O	AMERICAN SOFTWARE	9	15	9 3/4	-3/8	-3.7
N	ANACOMP INC	2	5	4 3/4	+1/4	+5.5
O	ANALYSTS INTL CORP	5	11	6 1/2	0	0.0
O	ASHTON TATE	6	23	21 3/4	-3/8	-1.6
O	ASK COMPUTER SYSTEMS	7	25	13 1/8	+1	+8.2
B	ASTRADYNE COMP IND	1	3	1 3/4		-3.3
N	AUTOMATIC DATA PROC	35	70	66 1/2	-1 3/4	-2.5
O	COMPUTER NETWORK	5	9	7 1/4	+1	+16.0
O	COMPUTER ASSOC INT'L	18	37	35 3/4	-1/4	-0.6
O	COMPUTER HORIZONS	5	11	11 3/4	0	0.0
N	COMPUTER SCIENCES	13	36	31 5/8	-7/8	-2.6
O	COMPUTER TASK GROUP	10	26	23 1/2	0	0.0
O	COMPUTER USAGE	1	3	1 7/8	0	0.0
O	COMPUTONE SYSTEMS	3	11	3 1/4	0	0.0
O	COMSERV CORP	1	6	4 3/8	0	0.0
O	COMSHARE	7	12	10 1/2	-1/8	-1.1
N	CULLINET SOFTWARE	12	33	12 1/4	-1/8	-1.0
O	CYCARE SYSTEMS INC	19	27	26 1/2	+2 1/2	+10.4
O	HOGAN SYSTEM INC	4	12	7 3/4	+1	+14.8
N	GENERAL ELECTRIC CO	56	78	76 1/8	-1 1/8	-1.4
N	GENL MOTORS E (EDS)	20	47	46 3/8	+1 3/4	+3.9
N	GTE CORP	38	53	52 1/8	-1/2	-0.9
O	INFORMATION SCIENCE	1	5	3 3/8	+1/8	+3.8
O	INFOTRON SYSTEMS CP	13	24	15 1/8	+5/8	+4.3
O	KEANE ASSOCIATES	10	20	13 1/2	-1/4	-1.8
N	LOGICON	25	43	35 1/8	-2 1/2	-6.6
O	LOTUS DEVELOPMENT CP	15	34	27 1/2	+1 1/4	+4.7
O	MCI COMMUNICATIONS	7	13	11	-3/8	-3.2
O	MNGT SCI AMER INC	7	16	11 3/8	0	0.0
D	MATHEMATICAL APP GRP	1	8	1 7/8	0	0.0
O	MICOM SYSTEMS INC	12	35	15 3/8	+1 1/8	+7.8
O	MICROPRO INT'L CP	2	4	3 3/8	0	0.0
O	NATIONAL DATA CORP	8	21	20 3/8	-1/2	-2.3
O	ON-LINE SOFTWARE INT	4	12	11 1/2	-1/2	-4.1
N	PANSOPHIC SYSTEMS	14	31	31 1/4	+3/4	+2.4
N	PLANNING RESEARCH	11	23	20 5/8	-2 1/8	-9.3
O	POLICY MGMT SYSTS CP	16	35	17 1/2	0	0.0
O	PROGRAMMING & SYS	4	9	8 1/4	+3/4	+10.0
O	REYNOLDS & REYNOLD	31	65	63 1/4	-3/4	-1.1
O	SEI CORP	13	27	24 3/4	0	0.0
O	SHARED MEDICAL SYST	26	38	36 1/4	+1 1/8	+3.2
O	SCIENTIFIC COMPUTERS	4	8	4 1/2	+1/4	+5.8
O	SOFTWARE AG	12	22	16 3/4	5/8	-3.5
N	URS CORP	10	17	17	+1/2	+3.0
N	UCCEL	11	19	19	+1/4	+1.3
O	VM SOFTWARE	17	24	19 3/4	+1	+5.3
	SEMICONDUCTORS					
N	ADVANCED MICRO DEV	22	36	28 3/4	+1	+3.6
O	ADV'D SEMICONDUCTOR	7	23	10 1/2	-1 1/4	10.6
N	ANALOG DEVICES INC	18	31	28 5/8	+2 1/8	+8.0
O	ANALOGIC CORP	11	16	12 5/8	-3/4	-5.6
N	APPLIED MAGNETICS CP	9	19	16 3/4	+3/8	+2.2
O	AVANTEK	18	26	21 3/8	1/8	-0.5
O	HADCO CORP	3	7	4 1/8	0	0.0
O	INTEL CORP	21	33	26	+3/4	+2.9
O	MICRO MASK INC	5	12	4 7/8	-1/2	-9.3
N	MOTOROLA INC	29	45	42 1/4	-1	-2.3
N	NAT'L SEMICONDUCTOR	10	15	12 1/2	-1/2	-3.8
N	TERADYNE	17	33	24 7/8	+1/2	+2.0

EXCH		52-WEEK RANGE (1)		CLOSE APR 9 1986	WEEK NET CHNGE	WEEK PCT CHNGE
	PERIPHERALS & SUBSYSTEMS					
P	AM INTERNATIONAL	3	8	6 7/8	-1/8	-1.7
A	ANDERSON JACOBSON	2	5	2 1/4	0	0.0
O	AST RESEARCH INC	7	33	19 1/8	+1 1/4	+6.9
O	AUTO-TROL TECHNOLOGY	3	13	4 1/2	D	0.0
O	AVANT-GARDE COMPUTNG	3	21	5	+1/4	+5.2
O	BANCTEC INC	6	12	11	+1/4	+2.3
O	BEEHIVE INT'L	1	2	1/8	0	0.0
N	BOLT,BERANEK & NEW	20	41	40 1/2	+1	+2.5
O	CAMBEX CORP	1	3	1 1/4	0	0.0
N	CENTRONICS DATA COMP	3	11	5 1/8	-3/8	-6.8
A	CETEC CORP	6	9	8 1/4	+1/8	+1.5
A	COGNITRONICS	4	7	4 1/8	+1/4	+6.4
N	COMPUGRAPHIC CORP	23	36	24 1/8	+3/8	+1.5
D	COMPUTER TRANSCEIVER	0	1	7/8	0	0.0
N	COMPUTERVISION CORP	9	44	15 1/4	-3/8	-2.3
N	CONRAC CORP	12	18	16 3/8	-1/4	-1.5
A	DATAPRODUCTS CORP	11	20	14	1 1/4	-8.1
A	DATARAM CORP	4	14	12 7/8	+5/8	+5.1
O	DATA SWITCH CORP	4	9	6 1/4	+1/2	+8.6
O	DATUM INC	5	9	5 5/8	+1/8	+2.2
O	DECISION DATA COMPUT	10	20	11 1/4	+1/4	+2.2
O	ENDATA, INC	2	8	6 5/8	-1/8	-1.8
O	EVANS & SUTHERLAND	12	24	20 1/8	-3/8	1.8
D	GANDALF TECHNOLOGIES	5	13	6 3/8	-3/8	-5.5
N	GEN'L DATA COMM IND	8	21	10 1/4	1/2	-4.6
N	HAZELTINE CORP	20	30	20 1/4	-1 1/4	5.8
O	ICOT CORP	3	12	10 3/8	-1/2	-4.5
O	INFORMATION INTL INC	10	17	12 7/8	0	0.0
O	INTECOM INC	3	11	3 1/2	+1/8	+3.7
A	LUNDY ELECTRONICS	10	15	14 3/8	0	0.0
O	MEGADATA CORP	3	8	3 3/8	-1/8	-3.5
A	MSI DATA CORP	7	13	11 1/8	-1/4	2.1
N	NASHUA CORP	24	43	42 5/8	+1 3/8	+3.3
O	NETWORK SYSTEMS CORP	11	27	12 1/2	+1 1/4	+11.1
N	NO AMERICAN PHILIPS	32	46	41 7/8	-4	-8.7
N	NORTHERN TELECOM LTD	26	41	28 1/2	-1/4	-0.8
O	OMEX	1	3	3/8	0	0.0
N	PARADYNE CORP	6	18	7 7/8	0	0.0
A	PENRIL CORP	7	14	7 7/8	0	0.0
N	PLESSEY CO (ADR)	19	32	31 1/4	-1/4	-0.7
O	PRINTRONIX INC	9	18	14 1/4	-3/8	-2.5
O	QMS INC	6	16	11 5/8	+1/8	+1.0
D	RAMTEK CORP	2	7	3 1/2	-3/8	-9.6
N	RECOGNITION EQUIP	9	17	12 7/8	-3/4	-5.5
N	SANDERS ASSOCIATES	30	44	40 7/8	1 5/8	-3.8
O	SCAN-TRON CORP	9	22	19 3/4	-1/4	-1.2
N	SCIENTIFIC ATLANTA	10	15	10 1/2	-3/8	-3.4
D	SEAGATE TECHNOLOGY	5	11	10 1/8	+3/8	+3.8
N	STORAGE TECHNOLOGY	1	5	3 3/4	-1/4	-6.2
O	SYKES DATATRONICS	0	2	3/8	-1/16	-14.3
A	TAB INC	5	9	6 1/2	+1/8	+1.9
A	TAB PRODUCTS CO	14	23	22 5/8	+1/8	+0.5
O	TANDON CORP	3	9	5 3/8	+3/8	+7.5
A	TEC INC	6	13	6	-1/4	-4.0
N	TEKTRONIX INC	47	68	55 7/8	+1/4	+0.4
N	TELEX	34	68	57 1/2	+5/8	+1.0
D	TESDATA SYSTEMS CP	0	3	7/8	-1/8	-12.5
N	TIMEPLEX INC	15	23	14 7/8	-1/4	-1.6
N	TITAN CORP	4	11	11 1/8	+7/8	+8.5
O	VISUAL TECHNOLOGY	1	3	5/8	0	0.0
	LEASING COMPANIES					
N	COMDISCO INC	7	22	20 3/4	-7/8	-4.0
N	CONTINENTAL INFO SYS	5	20	17 5/8	+1/8	+0.7
O	FINALCO GROUP INC	4	5	4 1/4	-1/4	-5.5
O	PHOENIX AMERICAN INC	2	4	4 1/8	+1/8	+3.1
O	SELECTERM INC	6	12	6 3/4	+3/4	+12.5
N	U.S. LEASING	32	46	44 3/4	-1 1/8	-2.4

EXCH. N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Source: Trade Quotes, Inc.

COMPUTER INDUSTRY

INSIDE

New Harris CEO John Hartley predicts flat sales and a 25% drop in earnings for the current fiscal year/**123**

Businessland acquires a 36-store chain but loses its president/**128**

IBM combines its CAD/CAM and factory floor/robotics divisions, focusing its computer-integrated manufacturing effort/**135**

Analysts remain bearish on upcoming first-quarter earnings reports/**154**

INSTANT ANALYSIS

"Everyone who works at Wang has to realize that he can't become particularly proud of his own turf."

— J. Carl Masi, after resigning as executive vice-president, sales and marketing, Wang Laboratories, Inc.

Wang revamps; Masi exits

Marketing group will report directly to Dr. Wang

By Clinton Wilder

LOWELL, Mass. — The increasingly visible and active role of founder An Wang in the management of Wang Laboratories, Inc. was made dramatically clear last week with the surprise resignation of the company's top marketing executive, J. Carl Masi Jr.

Wang's Masi

Masi, 44, Wang's executive vice-president of marketing and sales, resigned one week ago after Dr. Wang restructured the marketing organization to report directly to him instead of Masi. But Masi told *Computerworld* that because of Wang's increased role and the strong Wang family control of the company, he had been considering a change for several months.

"In the last two years, I've really been bitten by the CEO bug, and I couldn't see a clear growth path to that position within Wang," Masi, an 11-year Wang employee, said from his New Hampshire home. "The decision to change the marketing structure just made easier what otherwise was a very difficult decision."

Masi's departure came just days after the introduction of two significant Wang products, the VS 5 and 6, in which Masi played a prominent role. The company announced the marketing reorganization and Masi's resignation simultaneously. Under the new structure, Dr. Wang will take direct responsibility for three senior vice-presidents in sales and marketing: Robert L. Doretti of U.S. operations; Ian Diery of Europe, Africa and the Middle East; and Dodge Chu of the Americas, Asia and the Pacific Basin.

"The doctor has been focusing on different areas of the company — first R&D, then finance and now sales," said John McCarthy of Forrester Research, Inc., a Cambridge, Mass., office automation market research firm. "I know he's not happy with a lot of things that have been going on, and Masi got caught in the cross fire."

See **WANG** page 154

Comdisco settles audit with IRS

By Alan Alper

ROSEMONT, Ill. — Comdisco, Inc. last week said it will pay $6.1 million to the U.S. Internal Revenue Service to resolve an audit that questioned the computer leasing firm's accounting treatment of funds borrowed to finance equipment purchases.

According to Comdisco's senior vice-president of marketing, Robert Bardagy, the IRS had proposed levying a $200 million assessment asserting that funds borrowed from 1980 through 1982 to finance equipment purchases should have been treated as income [CW, Jan. 20]. Under the settlement, approved in U.S. Tax Court in Chicago, Comdisco's tax liability for that period was set at $6.1 million.

"We agreed that the deficiency was $6.1 million, and that's what we agreed to pay," Bardagy said. "A good portion — $5.4 million — will come back to us because of timing differences in which you get a tax credit for the amount of taxes you pay."

Bardagy termed the settlement a nonevent. "It was less of a problem than the public thought, and it concluded where we thought it would end up," he said.

In a letter to its shareholders, Comdisco Chairman and President Kenneth Pontikes said the settlement will "not cause any change or disruption to the company's normal practice of borrowing on a nonrecourse basis to finance the puchase of equipment placed on leases."

Moreover, he said, the settlement "will not have a material adverse effect on the

See **COMDISCO** page 154

INDUSTRY INSIGHT
Clinton Wilder
and Edward Warner

Cooperation wins the chips

The U.S. semiconductor industry reached a turning point at the beginning of this year and appears to be still on a roll. January marked the first time in 17 months that the semiconductor industry's book-to-bill ratio, the ratio of orders to sales, broke the 1.0 mark. The March book-to-bill ratio, released last Thursday, was 1.15 — an indicator that orders are still outpacing sales.

While the book-to-bill ratio is an inactive indicator of growth, other events were afoot earlier this year that will have an active role in changing the semiconductor industry for the better. Those events can be summed up in a word: cooperation.

In one case, it was two U.S. firms that had entered a cooperative development pact, but in the other case, it was a U.S. and a Japanese semiconductor manufacturer deciding to pool their talents. The agreements signed between both pairs of competitors are for the exchange of semiconductor expertise between companies that were smart enough to realize their respective shortcomings as well as the vast cost of conducting R&D separately.

The agreement between Advanced Micro Devices, Inc. (AMD) and Sony Corp. will mean to Sony industrial semiconductor expertise from AMD, while AMD gains Sony's know-how in consumer electronics equipment chips. The deal between National Semiconduc-

See **COOPERATION** page 128

Wilder is Computerworld*'s senior editor, computer industry, and Warner is editor of the Computerworld News Service.*

Manzi assumes helm at Lotus

Kapor will focus on strategies, development

By Eric Bender

CAMBRIDGE, Mass. — Lotus Development Corp. Chairman Mitchell Kapor last week relinquished the position of chief executive officer to President Jim Manzi.

Both executives emphasized that Kapor, who oversaw Lotus' meteoric rise from start-up to world's largest independent software vendor, will continue to devote all his efforts to the firm, focusing on overall strategies and product development.

The move does not indicate any upcoming major shifts in operations, planning or personnel at Lotus, Manzi told *Computerworld*. "When I wake up tomorrow, my job will be fundamentally the same as it is today," he said.

Kapor, who remains company chairman, began more than a year ago to spend more time on product development and less time on operational issues.

Last October, he temporarily took over the management of Lotus' mainstream Business Products Division spearhead a number of development initiatives. He gave up those responsibilities last month.

Manzi, 34, joined Lotus in May 1983 as director of corporate marketing. He was appointed vice-president of marketing and sales later that year and rose to the presidency in October 1984. He previously worked as a management consultant with McKinsey & Co.

Apricot breaks loose from British parent, will become distributor

By Edward Warner
Computerworld News Service

FREMONT, Calif. — The troubled U.S. subsidiary of British personal computer maker Apricot PLC broke away from its parent last week in a buy-out undertaken by two of the subsidiary's top executives. The subsidiary, Apricot, Inc., will become an Apricot distributor but will also gain the right to market hardware from vendors other than Apricot.

Analysts have said the Apricot subsidiary's lack of an IBM Personal Computer-compatible micro was partially responsible for the poor retail sales that dogged it since its 1983 arrival in the U.S. A spokeswoman for the firm said it hopes to begin marketing soon an IBM PC-compatible manufactured by another vendor.

Two Apricot vice-presidents, William Crouch and Ian Wallace, purchased all of Apricot's shares from Apricot PLC in a buy-out valued at several million dollars. The team of Crouch and Wallace — one an American, the other British — will jointly manage the company.

Though it will retain its 200 to 300 remaining retailers, spokeswoman Pat Meier said Apricot will continue to expand into additional niche markets. A point-of-sale system incorporating a cash register and a personal computer will also be introduced this year, she said.

In 1985, the Apricot subsidiary eliminated approximately half of its 40-person work force.

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